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WESTERN SPRUCE BUDWORM SUPPRESSION AND EVALUATION PROJECT USING CARBARYL

1978

Progress Report No. 2

Forest Insect and Disease Management
State and Private Forestry
Forest Service, USDA, Southwestern Region
517 Gold Avenue, SW
Albuquerque, New Mexico 87102

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Progress Report No. 2

by

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ABSTRACT

Carry over effects of a program to suppress a western spruce budworm, Choristoneura occidentalis Free., outbreak were achieved for a second year on the Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico. There was an average of 14.9 larvae per 100 buds on Douglas-fir in the spray area (37,450 acres) prior to treatment in 1977, about one larva per 100 buds remaining 14 days following treatment, and less than one larva per 100 buds were present in 1978. The average larval density per 100 buds of Douglas-fir in a comparable untreated check area (37,398 acres) was 12.4 for 1977 pre-spray sample, 6.9 for 1977 post-spray sample, and 8.7 for 1978 pre-spray sample. In 1978, the larval density in the untreated check area was nine times greater than in the treatment area. An average of 0.4 egg masses per meter square of foliage was recorded in the treatment area in 1978, compared with 10.1 density in the unsprayed area. Overall, egg mass density data indicate that larval densities will remain at about the same level in the unsprayed area in 1979 as found in 1978, but larval densities should decrease further in the treatment area. Defoliation in the treatment area in 1977 was about half of that recorded in the untreated check area and about one-tenth in 1978.

The only measured adverse environmental effect of the treatment was a reduction of some aquatic insects in one small stream that had been partially sprayed. Three families of aquatic insects had not recovered 1 year following treatment: Plecoptera-Chloroperlidae and Nemouridae; and Diptera-Stratiomyidae. Overall, the insect biomass was comparable for 1977 and 1978. There were no significant reductions in aquatic insects in two other creeks sampled in the treatment area that were not directly sprayed.

No adverse effects of treatment could be identified for birds, small mammals, reptiles, and non-target insects.

Tentative results of sampling of insect parasites of the budworm are presented.

Evaluation of effectiveness of suppressing the budworm outbreak will continue through 1979. Tree damage assessment and monitoring of aquatic insects in the three streams in the treatment area will be done.

I. INTRODUCTION

In 1977, Sevin ^{R} -4-oil was aerially applied on 37,450 acres of forested land to suppress a western spruce budworm, Choristoneura occidentalis Free., outbreak. The project, entitled Western Spruce Budworm Suppression and Evaluation Project, was done in an isolated mountain range on the Santa Fe National Forest and Jemez Indian Pueblo, New Mexico, where the possibility for reinfestation from nearby infestations was minimal. The objectives were to: 1) In 1977, suppress the budworm population to an acceptable level (criteria established to show success were reducing the budworm larval density by an average of 90 percent and obtaining an egg mass density of 1.5 new egg masses per square meter or about one egg mass per thousand square inches of foliage); 2) For 2 additional years, evaluate prolonged effectiveness of suppressing the budworm outbreak by gathering larval and egg mass data in the treatment area and a comparable untreated check area (37,398 acres); and 3) Evaluate annual defoliation and cumulative tree growth loss, mortality, and top-kill in the treatment and untreated areas.

The application phase of the project was successfully completed in 1977 (Parker et al. 1978).[1/] The 1976-7 budworm generation was reduced by an average of 93.1 percent compared with a 44.5 percent reduction in the untreated area. The adjusted budworm mortality, using Abbott's formula, was 87.5 percent. The average density of new egg masses was 1.6 per square meter (1.0 new egg masses per 1,000 square inches) in the treated area, and 11.2 per square meter (7.2 per 1,000 square inches) in the untreated area. Even though an average of 84.1 percent of the budworm larvae were in the latter instars (fifth and sixth) and 0.3 percent were pupae at the time of treatment, defoliation in the treatment area was considerably less than in the untreated area: treatment area-26.5 percent for Douglas-fir and 37.1 percent for white fir; untreated area-40.8 percent for Douglas-fir and 61.3 percent for white fir.

The purpose of this report is to document data collected in 1978. Also, raw data for larval and egg mass densities and defoliation in 1977 and 1978 are presented in the Appendix.

1/ Parker, Douglas L., Robert E. Acciavatti, and Eugene D. Lessard. 1978. Western spruce budworm suppression and evaluation project using carbaryl. Progress Rep. No. 1, USDA Forest Serv., Southwestern Reg., Albuquerque, NM.

II. METHODS

A. Entomological Phases

1. Sampling Locations

The treated and untreated areas were divided into six subunits in 1977 (Figs. 1 and 2). In each subunit, 25 permanent plots (3-tree cluster) were established, as uniformly as possible, throughout each subunit along roads and trails. Each plot was assigned a unique number.[2/] Data will be collected on these permanent plots until at least 1979.

2. Timing of Larval Sampling

For between-year-comparison of late-instar larval densities, sampling had to be done at about the same developmental point in the yearly cycle of the budworm. As a result, budworm larval development had to be closely monitored.

In 1978, development sampling was initiated in late May on all development clusters. Data were obtained from five 2-tree clusters located throughout the range of exposure and elevational differences in each subunit. Trees sampled for budworm development were not the same as those used to estimate late-instar larval densities, but clusters were at the same location.

Development sampling was started in late May and continued intermittently until buds began to swell. Then, development sampling was done every other day until 90 percent of current bud caps dropped, or 90 percent of the larvae were in the third and fourth instars. At this time, daily sampling was done until at least 20 percent of the larvae were in the fifth and sixth instars.

3. Evaluating Second-Year Project Effectiveness

The lasting effectiveness of insecticide treatment was determined by (1) measuring budworm larval and egg mass densities in 1978, and (2) comparing them with similar data collected in 1977.

2/ Identifying cluster numbers and their locations are shown in Figures 38 to 53 in Progress Rep. No. 1, Ibid.

a. Sampling Design for Larvae

Larval sampling began when 20 percent of the larvae were in the fifth and sixth instars. Larval density data were obtained on up to 25 plots per subunit. In some subunits, fewer than 25 plots were sampled. Six plots were destroyed by fire and logging, and four were inaccessible due to road closures. Three trees were sampled per plot. Sample trees were codominant Douglas-fir, 30 to 50 feet in height, and relatively open-grown with full crowns. Sample branches were cut from opposite sides of the midcrown of trees with a pole pruner and attached collecting bag. Larval densities were expressed as larvae per 100 live buds to give equal weight to each branch sampled. Cluster means were computed by averaging the larval density on each sample branch per tree, and then averaging the 3-tree means.

b. Sampling Design for Egg Masses

In late July, two branches (70 cm in length) were cut from opposite sides of sample trees on permanent plots. The length and width of each branch was used to calculate foliated branch area.

Foliage from all branches were examined under ultraviolet light for egg masses. Needles bearing egg masses were classed as from current year's foliage, or a previous year, and kept separate in labeled pill boxes. New and old egg masses were separated under a stereomicroscope. All egg masses on current year's foliage were classed as new, and their characteristics formed the basis for aging those egg masses found on the previous year's foliage.

c. Analysis of Population Reduction

Estimates of two types of population density per plot were computed for each sampling period--year 1 and year 2. Larval densities were expressed as the number of late-instar larvae per 100 live buds. Egg mass density was expressed as number of new masses per square meter (1550 sq. in.) of foliage. Subunit and treatment level means and standard errors were computed as follows:

(1) Subscripts:

i = treatments	1 = spray 2=check
j = subunit	j = 1, 6
k = cluster	k = 1, 25
l = tree	l = 1, 3
m = branch	m = 1, 4 for larval density
	m = 1, 2 for egg density

(2) Cluster Level:

Pre-spray population

$$pre_{ijk} = \frac{\sum_{l=1}^{3} \sum_{m=1}^{2} \frac{budworm_{ijklm}}{buds_{ijklm}}}{6} \quad (100)$$

Originally, there were 300 cluster level values for each variable (2 treatments X 6 subunits X 25 clusters = 300), but 290 values were used because 10 plots were lost.

(3) Subunit Level Calculations of Means and Standard Errors. Means and standard errors were calculated for each of the three variables at the subunit level. The formulas follow, using X_{ijk} as an example for one of the variables.

$$X_{ij} = \sum_{k=1}^{n} \frac{X_{ijk}}{n}$$

, where X_{ij} is the mean for the j^{th} subunit in the i^{th} treatment.

$$S.E.\ x_{ij} = \sqrt{\frac{\sum_{k=1}^{n} X_{ijk}^2 - \left(\frac{\sum_{j=1}^{n} X_{ijk}}{n}\right)^2}{(n-1)}},$$

where S.E. x_{ij} is the standard error of the mean x_{ij}.

(4) Treatment Level Calculations of Means and Standard Errors. Assumptions made for each of the subunits are independent of each other and are self-weighting.

$$X_i = \sum_{j=1}^{6} X_{ij/6}$$ where X_i is the mean for the i^{th} treatment.

$$S.E.\ x_i = \sum_{j=1}^{6} S.E.\ x_{ij}^2$$

(5) Statistical Tests. Budworm densities were compared for the same year between the treated and untreated check populations, as well as comparing the densities between years for the same populations.

For populations with possibly different means, but a common variance, the general linear model was expressed by the following:

$X_{ij} = u + T_i + E_{ij}$, where x_{ij} is the observation of interest in the j^{th} plot of the i^{th} treatment, and T_i is the effect of the treatment mean and with a random error term E_{ij}. The subscript j now represents all of the plots from each subunit in the i^{th} treatment. j = 150 or less.

(a) Assumption: Subsequent yearly samples are independent, taken from the same population.

(b) Hypotheses Tested:

	Treatment		Checks
H1:	year 1 = year 2		year 1 = year 2
H2:	year 2 = year 3		year 2 = year 3
H3:	year 1	=	year 1
H4:	year 2	=	year 2
H5:	year 3	=	year 3

If the treatment effectiveness is long-term, the following results may be expected from testing the various hypothesis:

H3: Expect to be the same
H4, H5: Expect to be different

H1, H2: For the checks, expect to be the same
H1: For treated, expect to be different
H2: For treated, expect to be the same

Since all data can be pooled for the same population and treated as one sample, i.e., 25 clusters for each of six subunits or 150 observations, the test for a difference would be extremely sensitive. However, the intent is not to be able to detect small differences, but rather to be able to state that the residual population in the treated population remains at a low level, i.e., 2-5 budworm per 100 buds.

Further work in time series analysis, i.e., continuous sampling from the same population, will be evaluated to see if other forms of analysis would be more appropriate.

B. Tree Damage Appraisal Phases

1. Evaluating Defoliation

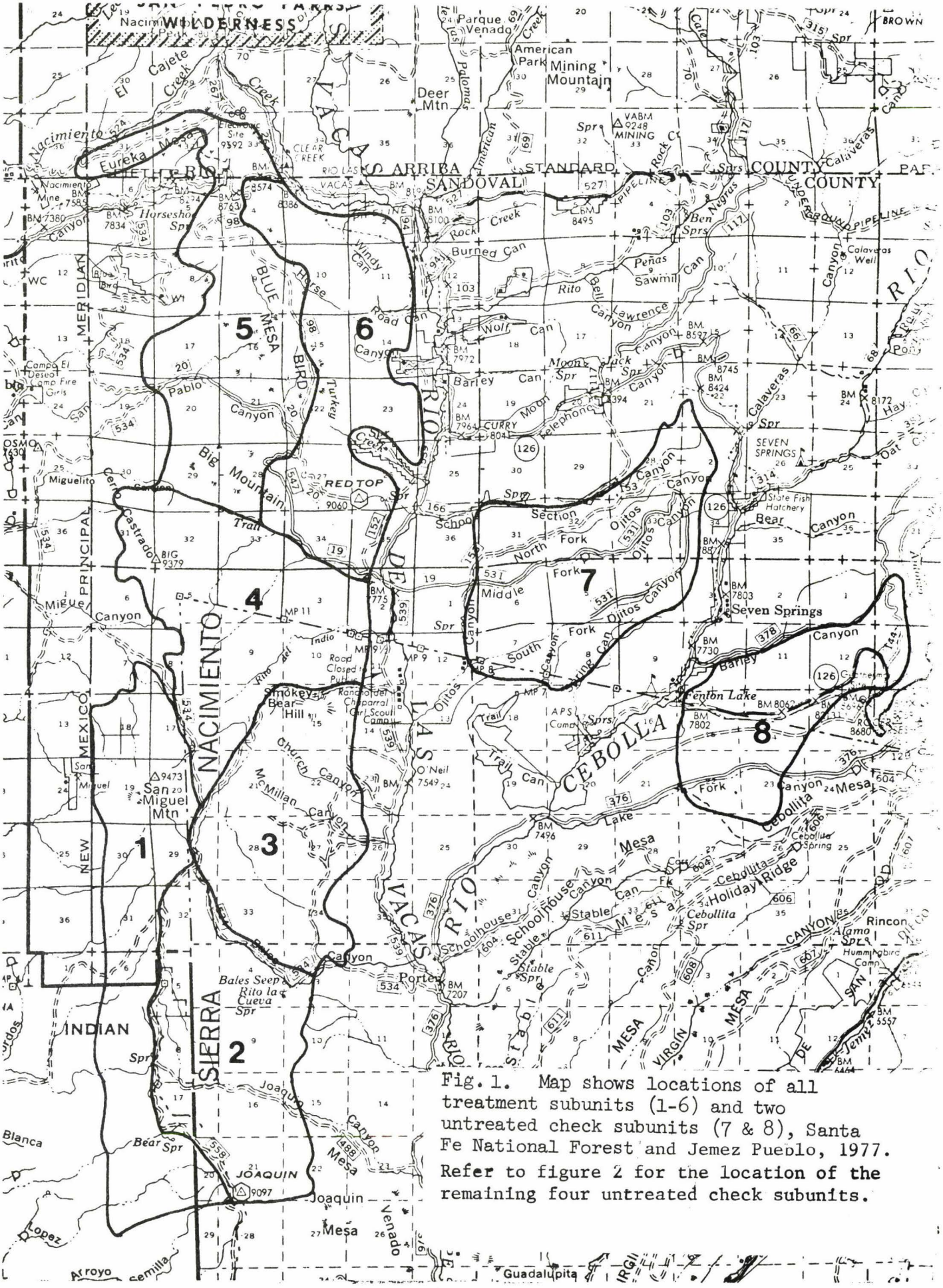
a. Immediate

Defoliation on Douglas-fir was sampled on 15 clusters in each subunit. White fir clusters were selected in eight subunits (subunits 2, 3, 4, and 5 in the treatment area, and 8, 9, 10, and 11 in the untreated areas, Figures 1 and 2). The white fir clusters are adjacent to the Douglas-fir clusters. On all clusters, three codominant Douglas-fir and three codominant white fir trees, 30 to 50 feet tall, with relatively open-grown crowns, were sampled.

Sample branches consisted of four apical branches, 70 cm in length, taken from four quadrants at midcrown of each sample tree. From each of these branch samples, 25 new shoots were examined for current defoliation using the left side of one branch and the right side of another, and so on. Each new shoot was individually examined for defoliation and assigned an index value as follows:

6-class

Defoliation class %	Index value	Midpoint value %
0	0	0
1-25	1	12.5
26-50	2	37.5
51-75	3	62.5
76-99	4	87.5
100	5	100


1
2
3
4
5
6
7
8
RIO ARRIBA
SANDOVAL
COUNTY
COUNTY
NACIMIENTO
SIERRA
LOS PINOS
RIO DE LAS VACAS
RIO DE LA CEBOLLA
PRINCIPAL MERIDIAN
NEW MEXICO
INDIAN
WILDERNESS
Nacimiento
Eureka Mesa
El Cajete Creek
Deer Mtn
American Park
Mining Mountain
Parque Venado
Rock Creek
Burned Can
Windy Can
Horse Road Can
Wolf Can
Barley Can
Turkey Canyon
BLUE MESA
BIRD
Pablo Canyon
Big Mountain
Trail
REDTOP
9060
Cerro Castrado
BIG
9379
Miguelito Canyon
Miguel Canyon
Indio Road Closed Pvt.
Smokey Bear Hill
Rancho del Chaparral Girl Scout Camp
Church Canyon
McMillan Canyon
San Miguel Mtn
9473
O'Neil
7549
Bales Seep
Rito la Cueva
Spr
Porter
BM 7207
Schoolhouse Canyon
Stable Spr
Cebollita Spr
Cebollita Mesa
Holiday Ridge
Cebollita Lake
BM 7496
Fenton Lake
BM 8062
Seven Springs
BM 7803
BM 7730
BM 7802
APS Camp
Spr
Ditos Canyon
North Fork
Middle Fork
South Fork
Section School
Oat Hay
Bear Canyon
State Fish Hatchery
SEVEN SPRINGS
Calaveras Canyon
Calaveras Well
Ben Negras Spr
Peñas Sawmill Can
Bell Canyon
Lawrence Canyon
Moon Spr
Black Canyon
CURRY Mount Telephone
BM 8745
BM 8424
BM 8172
BM 8597
BM 8495
BM 8100
BM 7972
BM 7964
BM 8574
BM 8763
BM 8386
BM 7834
BM 7380
VABM 9248 MINING
Rock Cr
Spr
Nacimiento Mine
Horseshoe Spr
Nacimiento Electronic Site 9392
CLEAR CREEK
RIO LAS VACAS
Campo El Deseo Camp Fire Girls
Miguelito
Cebollita Canyon
Cebollita Fk
Rincon
Alamo Spr
Hummingbird Camp
Jemez
BM 5557
Joaquin Mesa
JOAQUIN
9097
Bear Spr
Blanca
Lopez
Arroyo Cemilla
Guadalupita
Venado
Canyon
Mesa
Fork
Lake
Spring
Ridge
Holiday
Rincon
Alamo
Hummingbird
Camp
Jemez
Virgin
Mesa
Canon
Stable
Schoolhouse
Cebollita
Fenton
Seven Springs
Ditos
Oat
Hay
Bear
Calaveras
Ben Negras
Peñas
Sawmill
Bell
Lawrence
Moon
Black
Curry
Telephone
Barley
Wolf
Burned
Windy
Horse
Road
Rock
Creek
Pablo
Turkey
Big
Mountain
Trail
Redtop
Cerro
Castrado
Miguelito
Miguel
Indio
Road
Closed
Pvt.
Smokey
Bear
Hill
Rancho
del
Chaparral
Girl
Scout
Camp
Church
McMillan
San
Miguel
Mtn
O'Neil
Bales
Seep
Rito
la
Cueva
Spr
Porter
Schoolhouse
Stable
Spr
Cebollita
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Cebollita
Mesa
Holiday
Ridge
Cebollita
Lake
Fenton
Lake
Seven
Springs
APS
Camp
Spr
Ditos
Canyon
North
Fork
Middle
Fork
South
Fork
Section
School
Oat
Hay
Bear
Canyon
State
Fish
Hatchery
SEVEN
SPRINGS
Calaveras
Canyon
Calaveras
Well
Ben
Negras
Spr
Peñas
Sawmill
Can
Bell
Canyon
Lawrence
Canyon
Moon
Spr
Black
Canyon
CURRY
Mount
Telephone
Barley
Can
Wolf
Can
Burned
Can
Windy
Can
Horse
Road
Can
Rock
Creek
Pablo
Canyon
Turkey
Canyon
BLUE
MESA
BIRD
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Canyon
San
Miguel
Mtn
9473
O'Neil
7549
Bales
Seep
Rito
la
Cueva
Spr
Porter
BM
7207
Schoolhouse
Canyon
Stable
Spr
Cebollita
Spr
Cebollita
Mesa
Holiday
Ridge
Cebollita
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7803
BM
7730
BM
7802

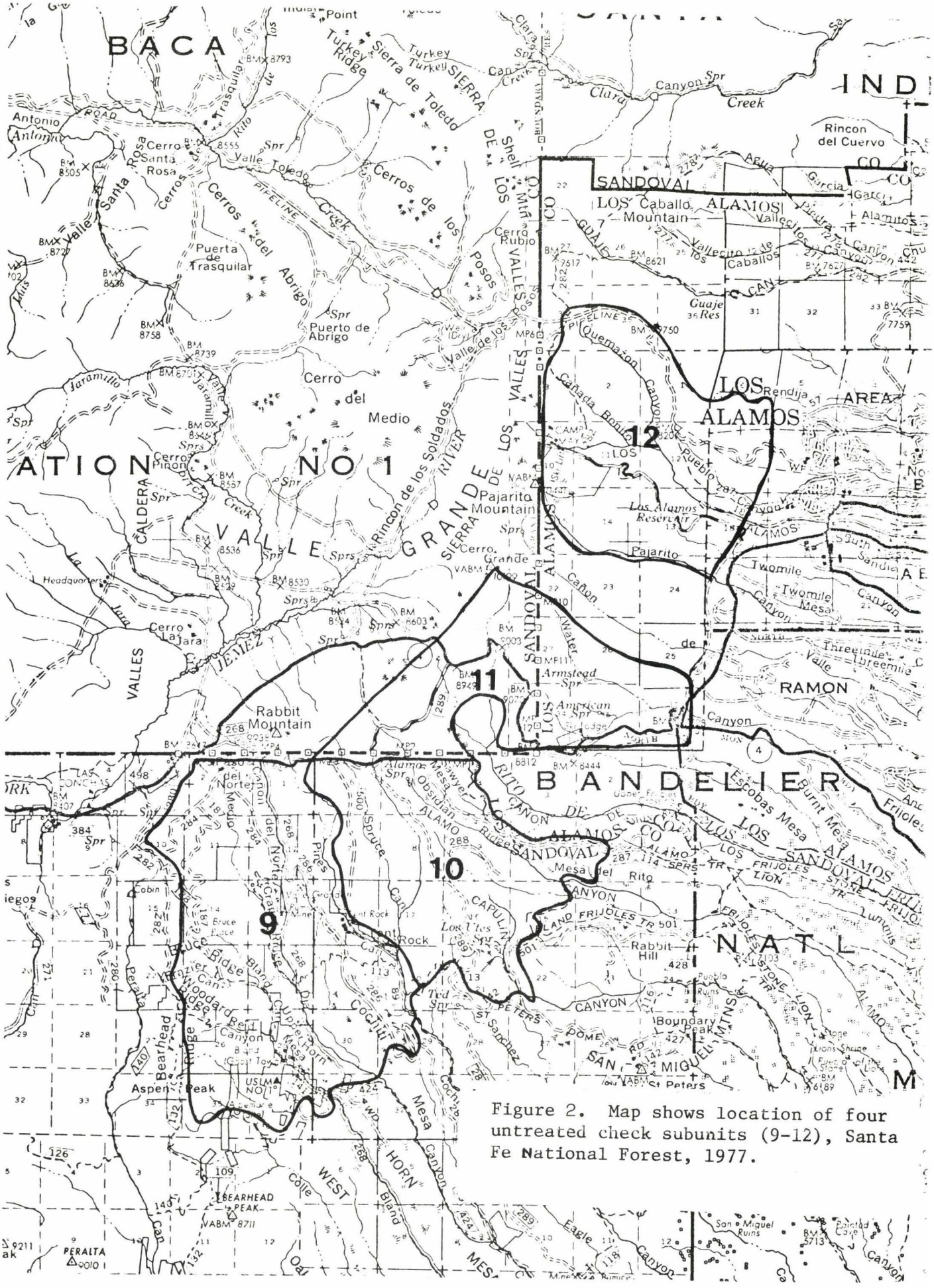

Figure 2. Map shows location of four untreated check subunits (9-12), Santa Fe National Forest, 1977.

Defoliation estimates were analyzed on a "per cluster" basis.

The following formulas were used to determine the percent defoliation on a "per cluster" basis.

6-Class

$$\text{Percent defoliation} = \frac{n_1\ (12.5) + n_2\ (37.5) + n_3\ (62.5) + n_4\ (87.5) + n_5\ (100)}{N}$$

where n_1 = number of twiglets with index value 1
n_2 = number of twiglets with index value 2
n_3 = number of twiglets with index value 3
n_4 = number of twiglets with index value 4
n_5 = number of twiglets with index value 5
N = total number of twiglets examined per plot = 300

b. Long-term

The same methods used to evaluate immediate defoliation were used to evaluate long-term defoliation. Regression analysis was used to compare the number of egg masses per square meter of foliage in 1977 to percent defoliation in 1978. This relationship will be examined again for 1978 egg masses and 1979 defoliation and 1979 egg masses and 1980 defoliation.

2. Growth Loss, Tree Mortality, and Top-kill

In 1980, increment core samples will be taken on each of the Douglas-fir and white fir trees used for defoliation estimates. In addition to the host trees, one non-host (ponderosa pine) tree on each plot will be sampled. Two increment cores, 90 degrees apart, will be taken at d.b.h. per sample tree. Core samples will be placed in paper straws for storage. Straws will be labeled as to subunit, cluster, and tree number and species. Cores will be stored in a cooler prior to measurement.

Core samples from the non-host trees will be used to determine the expected growth in host trees. Percent growth, above and below the expected value, will be determined for host trees on a "per cluster" basis. Percent growth will then be compared to percent defoliation for each year from 1977 through 1980.

Seedling and sapling (0.1 to 4.9 inches d.b.h.) mortality will be evaluated on all 25 clusters in each of the treated and untreated subunits. On each cluster, a permanent 1/100-acre circular subplot was established in 1977. All seedlings and saplings on the subplot were recorded by tree species and damage (live or dead). Trees with a d.b.h. of 0.5 to 4.9 inches are considered as saplings. Trees with a d.b.h. of less than 0.5 inches, or trees less than 4.5 feet in height, were considered as seedlings. Trees killed by the budworm will be recorded in 1979.

Mortality and top-kill of sawtimber-size trees will be evaluated in both the treated and untreated subunits in 1980. In 1977, 12 1-acre plots were photographed at a scale of 1:3300 on a photographic strip in each of the 12 units. A forward overlay of 60 percent was used. The aerial platform consisted of a Cessna 206 aircraft equipped with a 70 mm Hasselblad EL/M camera, a 250 mm lens, and Wratten 12 filter equivalent, using 2443 infrared aerial Kodak film. The film was interpreted with a Bausch and Lomb 240 Z stereoscope, mounted on a light table.

Eleven ground truth plots (five treatment and six untreated subunits) were selected for ground examination. One plot in a treatment subunit was not checked because of adverse weather. This plot was examined in the spring of 1978. A hand-held stereo viewer, with an independent light source, was used to view the photo plots in the field for establishing boundaries. One side of the boundaries of the ground plots was measured using slope correction factors. Plot corners were staked, and string was used to delineate boundaries. All mortality and top-kill within plots were recorded.

Double sampling with regression was used to obtain an estimate of mortality and top-kill in the treatment and untreated units.

The following prediction equation was used to obtain an adjusted estimate of trees per plot (Wear et al. 1966 [3/]):

$$YRd = Y_2 + b\,(x_1 - x_2)$$

where:

YRd = estimate of average number of dead or damaged trees from a regression double sample

3/ Wear, J. F., R. B. Pope, and P. W. Orr. 1966. Aerial photographic techniques for estimating damage by insects in Western forests. USDA. Forest Serv., Pacific Northwest Forest and Range Exp. Sta., Portland, Oregon.

Y_2 = mean of all field plot measurements in the ground truth subsample

b = regression coefficient of field on photo measurements from those plots that have both photo and ground truth data

x_1 = mean photo measurement of numbers of dead or damaged trees from the large sample of photo plots

x_2 = mean photo measurement of number of dead or damaged trees from only those plots with ground truth measurements

The 12, 1-acre plots again will be photographed in 1980, and tree mortality and top-kill data will be recorded.

C. Monitoring

1. Aquatic Organisms

Two small creeks (San Pablo and Trail) were monitored in 1978 to assess the effects of the treatment on aquatic organisms 1 year after spraying. U. S. Fish and Wildlife Service personnel did the sampling, which consisted of obtaining creek drift samples using a 10-inch ring net and Surber square foot bottom samples. Samples were taken at one site on each stream.

2. Birds, Small Mammals, Reptiles, and Non-target Terrestrial Insects

The purpose of the monitoring was to assess the effects of spraying with carbaryl 1 year after treatment. Methods used in 1977 were repeated in 1978. However, no reptiles were found in the 1977 sampling, and they were not monitored in 1978. Also, studies on non-target insect populations in 1977 yield such variable data that comparisons could not be made this year, and no samples were taken in 1978.

a. Birds

For avian populations, the same study site used in 1977, 1-mile segment on Smokey Bear Hill Road (subunit 3), was sampled in 1978. One observer censused breeding birds on the 1-mile transect using a modified Emlen Transect Method (Emlen 1971).[4/] Censuses were done on June 27, 28, and 29, 1978.

4/ Emlen, J. T. 1971. Population densities of birds derived from transect counts. Auk 88:323-342.

b. Small Mammals

Small mammal trap lines were set in June and July 1978 to determine if there were effects on population density due to treatment. Trap lines were set at the same two sites censused in 1977: treatment area, Bales Canyon on Smokey Bear Hill Road, elevation 2,700 m; and untreated check area, Lake Fork Canyon at 7.2 km northeast of Parter's Landing, 2,500 m in elevation. Trap lines consisted of 100 Museum Special snap traps baited with oatmeal. The lines were run for 3 nights and 2 days at each site; June 26, 27, and 28 in Bales Canyon and July 3, 4, and 5 in Lake Fork Canyon.

3. Insect Parasites of the Western Spruce Budworm

John Schmid, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, Colorado, completed the second year's sampling to determine the incidence of insect parasitism. Budworm larvae and pupae were collected from at least 20 trees in each of six treated and six untreated check subunits. Larval and pupal parasites were then reared and identified to determine parasitism, and which parasites were present.

III. RESULTS

A. Entomological Phases

1. Larval Density

Suppression effects were achieved in the treatment area for a second year. An average of 14.9 larvae per 100 buds was found on Douglas-fir in the 1977 pre-spray sample, about one larva per 100 buds remaining 14 days following treatment, and less than 1 larva per 100 buds was present when the 1978 pre-spray sample was taken. Refer to Table 1 for average larval densities in subunits 1-6. In the untreated check area, average pre-spray densities per 100 buds follow: 1977, 12.4; 1978, 8.7. Again, refer to Table 1 for average larval densities in untreated check subunits 7-12. There was a natural decline in the infestation intensity in the untreated area from 1977 to 1978. The factor that caused this decline may have helped to keep the suppressed budworm population at a low level. However, there was still a significant difference between the larval densities in the treatment and check subunits (Fig. 3).

2. Egg Mass Densities

Egg mass density data for all subunits are shown in Table 2. The treatment area had an average of 1.7 new egg masses per meter square of foliage following treatment in 1977. The 1978 density dropped to 0.4 egg masses per meter square of foliage. In the untreated subunits, the average 1977 egg mass density was 5.8

Table 1.--Western spruce budworm larvae per 100 buds on Douglas-fir for 1977 pre- and post-spray samples and 1978 pre-spray samples, Santa Fe National Forest and Jemez Pueblo lands, New Mexico.

		Budworm Larvae Per 100 Buds					
		1977 Pre-spray[a]		1977 Post-spray		1978 Pre-spray[a]	
Subunit	No. of Plots	Mean	S.E.	Mean	S.E.	Mean	S.E.
1	25	20.5	2.5	1.7	0.4	1.3	0.4
2	25	11.9	2.1	0.7	0.2	0.4	0.1
3[b]	25	11.7	1.7	1.1	0.3	0.4	0.1
4	25	17.9	2.2	1.0	0.2	1.2	0.4
5	25	18.2	2.8	1.1	0.4	1.5	0.7
6	25	9.0	1.1	0.6	0.2	0.6	0.2
Average		14.9		1.0		0.9	
7	25	2.7	0.4	0.8	0.2	2.0	0.4
8	25	9.5	1.8	5.8	1.0	10.7	2.0
9[c]	25	8.7	1.5	4.6	0.8	11.8	1.7
10[d]	22	17.7	3.0	7.8	1.2	11.5	1.4
11	25	12.6	2.1	8.3	1.5	10.8	1.3
12	25	14.3	2.2	8.1	1.2	5.5	0.8
Average		12.4		6.9		8.7	

a/ 1977 and 1978 pre-spray samples were taken when 20 percent of the larvae was in the 5th and 6th instars, and before 5 percent had pupated.

b/ 20 plots sampled in 1978.

c/ 22 plots sampled in 1978.

d/ 3 plots destroyed by fire in 1977.

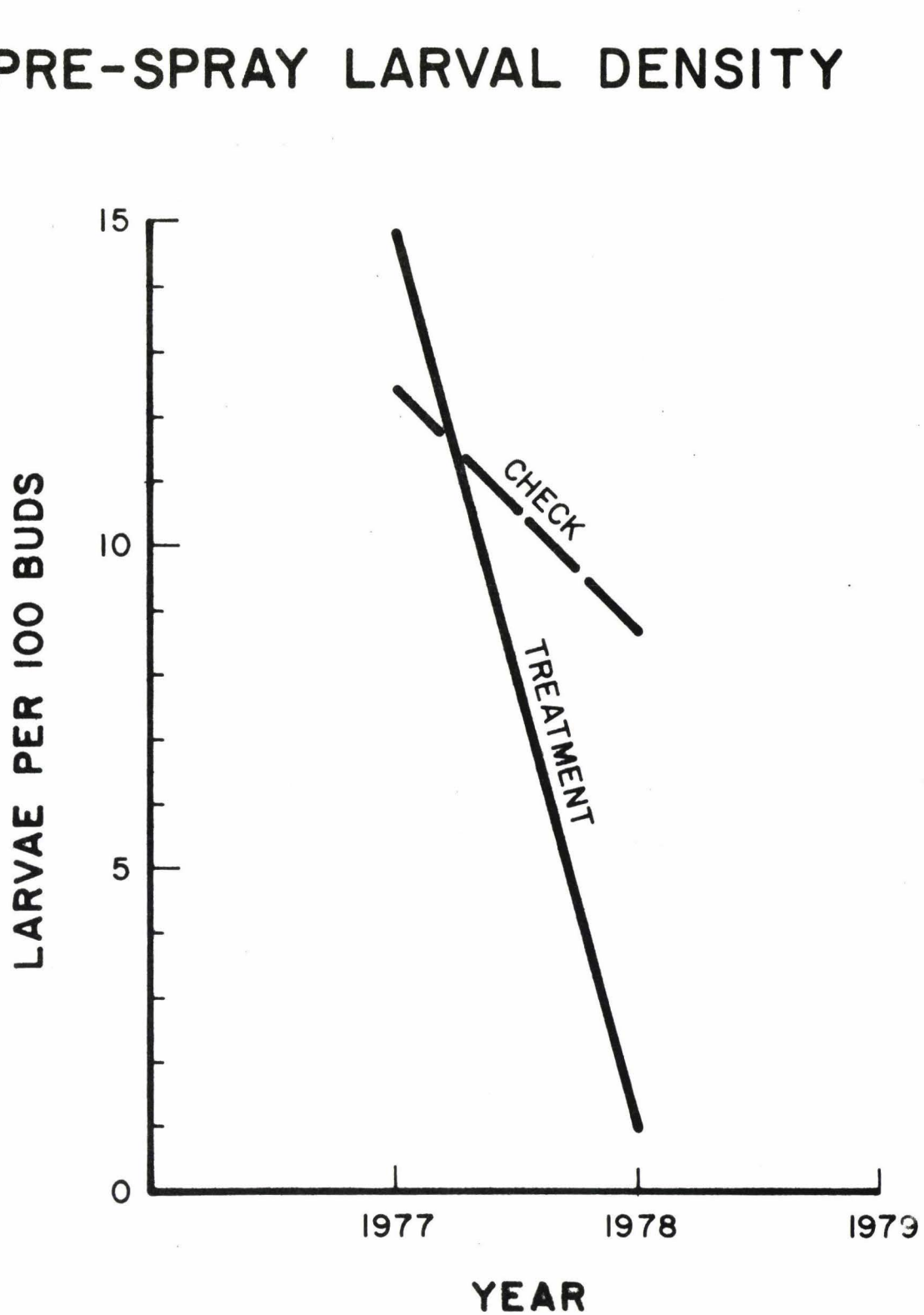

Figure 3.--This graph compares average larval densities by year in the treatment and untreated check areas. Sampling was initiated when 20 percent of the larvae were in the fifth and sixth instars and completed before 5 percent of the larvae had pupated, Santa Fe National Forest and Jemez Pueblo Lands, New Mexico.

Table 2.--Western spruce budworm suppression-evaluation project egg mass densities, Santa Fe National Forest and Jemez Pueblo lands, New Mexico.

Treated Subunits	Egg Masses Per m^2 1977 Mean	1977 S.E.	1978 Mean	1978 S.E.	Egg Mass Ratio 1978:1977	1979 Infestation trend
1 San Miguel	4.2	1.1	0.9	0.3	0.2:1	decreasing
2 Joaquin	1.4	0.5	0.0	0.0	-0-	---
3 Smokey Bear	0.2	0.1	0.2	0.1	1.0:1	static
4 Trail	1.9	0.6	0.6	0.2	0.3:1	decreasing
5 Blue Bird	1.2	0.4	0.4	0.2	0.3:1	decreasing
6 Red Top	1.0	0.3	0.5	0.2	0.5:1	decreasing
Average	1.7		0.4		0.2:1	decreasing
Untreated Subunits	Mean	S.E.	Mean	S.E.		
7 Ojitos	1.0	0.3	1.0	0.3	1.0:1	static
8 Lake Fork	7.5	1.7	11.2	2.6	1.5:1	increasing
9 Cochiti	11.6	2.9	12.4	2.5	1.1:1	increasing
10 Capulin	14.4	2.5	12.5	1.9	0.9:1	decreasing
11 Am. Springs	7.4	1.1	11.1	1.7	1.5:1	increasing
12 Los Alamos	17.5	2.6	12.5	1.9	0.7:1	decreasing
Average	9.9		10.1		1.0:1	static

times greater (9.9 egg mass per meter square of foliage) than in the treatment area. In 1978, there was an average of 10.1 egg masses per meter square in the untreated subunits, which is 25 times greater than in treatment subunits (Fig. 4).

A comparison of 1977 to 1978 egg mass densities shows that there will be a general decrease in the infestation trend in treatment subunits. For untreated subunits, the following trends will occur: increasing, subunits 8, 9, and 11; static, subunit 7; and decreasing, 10 and 12.

Overall, egg mass density data indicate that larval densities will remain at about the same level in untreated check subunits, but decrease in treatment subunits. Therefore, suppression success should be achieved for a third year.

B. Tree Damage Appraisal Phase

1. Defoliation

There was a significant reduction in defoliation in the treatment area compared with the untreated check area for both 1977 and 1978 (Table 3). In 1977, treatment was conducted after 20 percent of the budworm larvae were in the fifth and sixth instars, which would lead one to believe that treatment would not reduce defoliation. However, defoliation was lower in the treatment area, which had comparable larval densities with subunits 8-12. The average savings in foliage was about 40 percent for white fir and 35 percent for Douglas-fir. These percentages, which are rough estimates, were calculated as follows: 61.3 (defoliation in the check area) minus 37.0 (defoliation that occurred in the treatment area before treatment) divided by 61.3. As would be expected, the amount of foliage savings in 1978 was even greater: white fir, 89 percent; Douglas-fir, 90 percent.

Refer to Figure 5 for a comparison of defoliation data in the treatment and untreated check areas.

2. Other Tree Damages

Information on growth loss, top-killing, and tree mortality will be collected in 1980. Results will be presented in future reports.

EGG MASS DENSITY

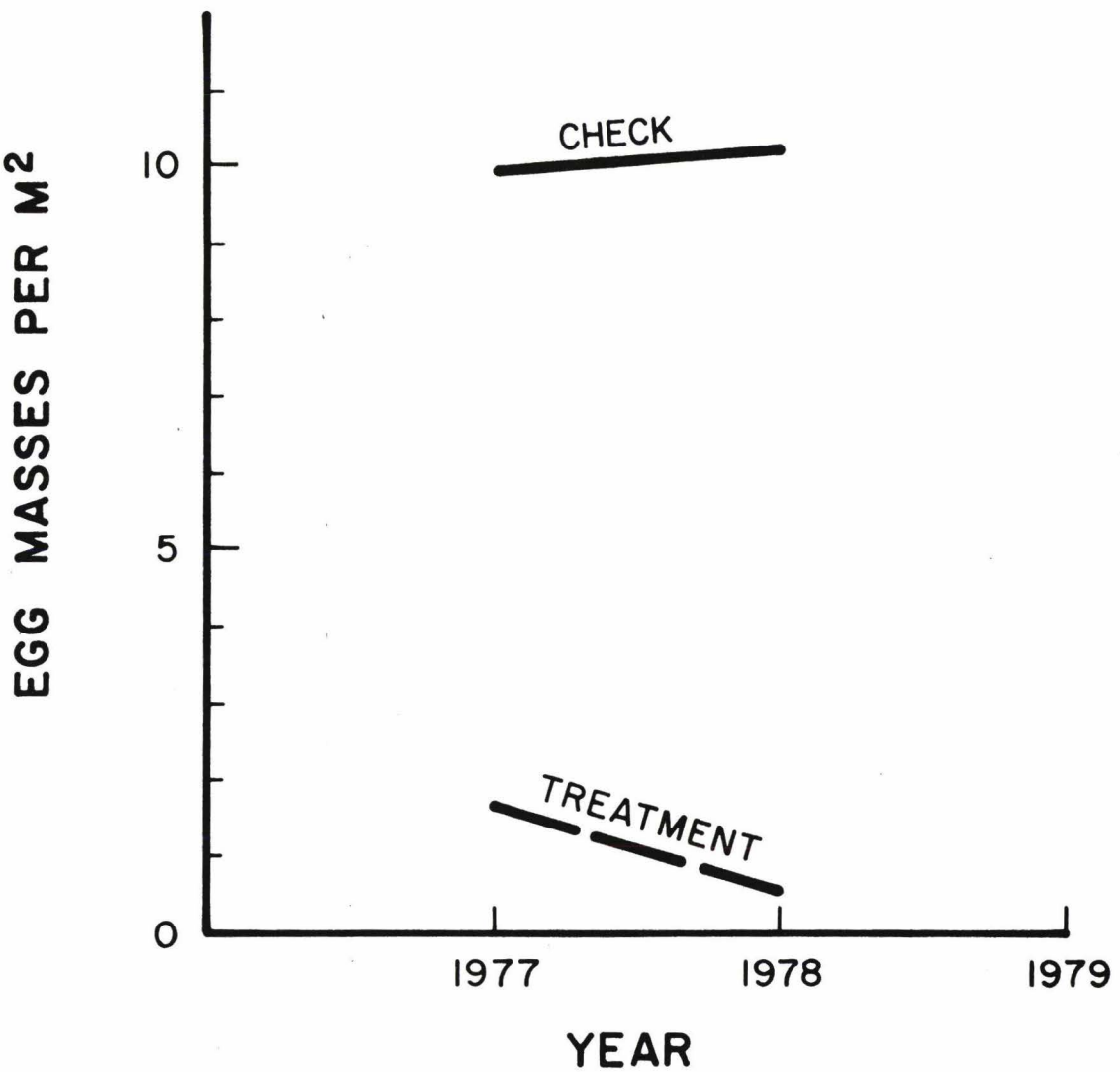

Figure 4.--This graph compares average egg mass densities by year in the treatment and untreated check areas. Besides the significantly lower density of egg masses in the treatment area, these data show that suppression will be achieved for a third year, Santa Fe National Forest and Jemez Pueblo lands, New Mexico.

Table 3.--Percent defoliation by subunit for white fir and Douglas-fir, 6-class system, Santa Fe National Forest and Jemez Pueblo lands, New Mexico.

Treated Subunits	% def.-white fir 1977	1978	% def.-Douglas-fir 1977	1978
1 San Miguel			41.6	4.5
2 Joaquin	28.6	3.1	19.9	1.5
3 Smokey Bear	24.8	5.2	18.0	1.1
4 Trail	53.1	7.2	37.0	5.4
5 Blue Bird	41.8	5.7	25.8	2.7
6 Red Top			16.6	2.0
Average	37.0	5.3	26.5	2.9
Untreated Subunits				
7 Ojitos			14.1	9.4
8 Lake Fork	62.2	58.1	51.1	40.9
9 Cochiti	52.8	46.8	37.2	35.3
10 Capulin	63.6	38.7	51.2	29.0
11 Am. Springs	66.4	46.3	34.2	29.1
12 Los Alamos			56.7	23.8
Average	61.3	47.5	40.8	27.9

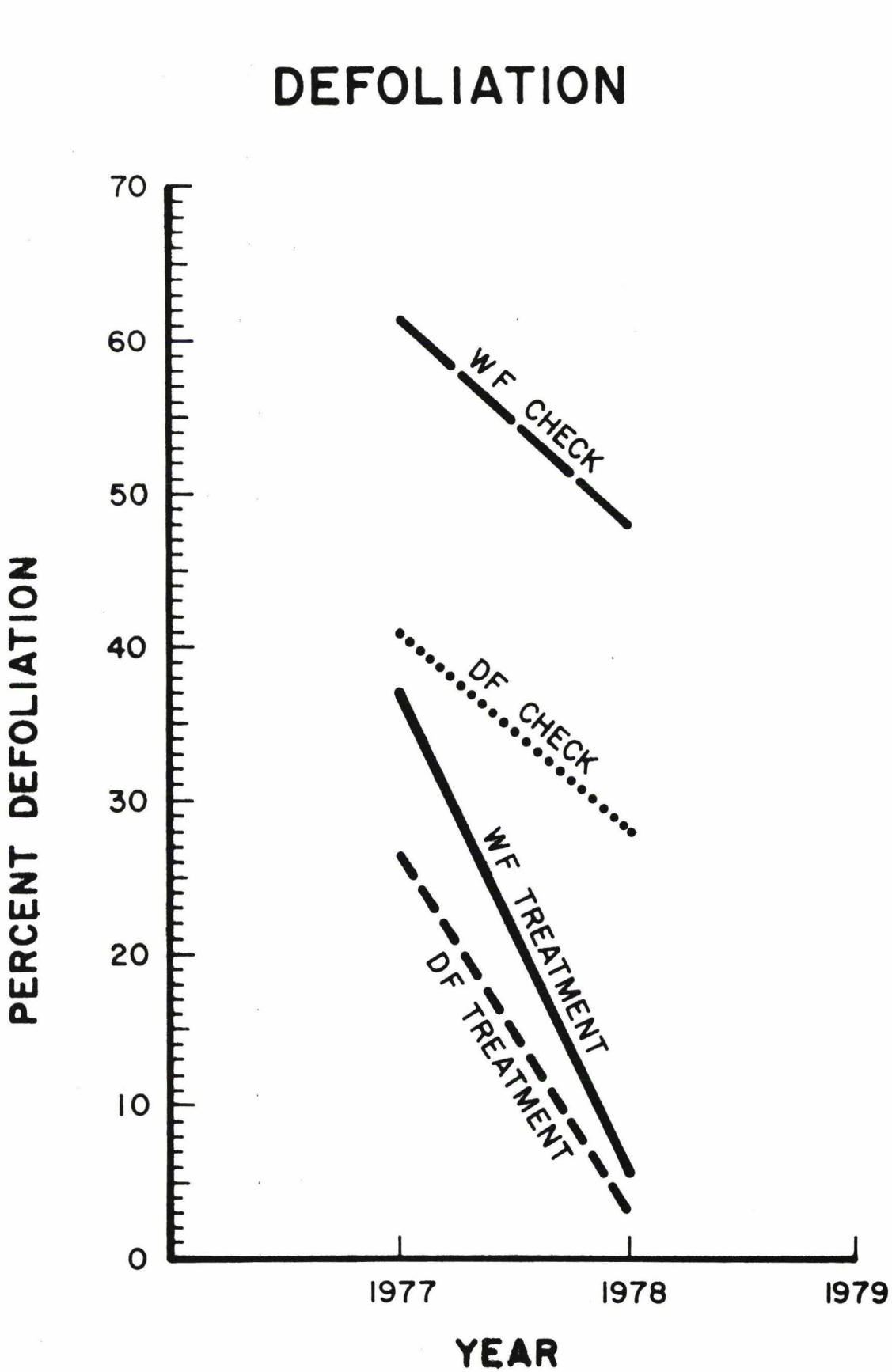

Figure 5.--This graph compares average defoliation of Douglas-fir (DF) and white fir (WF) by year in the treatment and untreated check areas. Defoliation in the treatment area was considerably lower for both tree species in the treatment year (1977) and the following year, Santa Fe National Forest and Jemez Pueblo lands, New Mexico.

C. Monitoring

1. Aquatic Organisms [5/]

Of the three creeks monitored in 1977, San Pablo Creek was the only stream where the effects of treatment on aquatic insects were demonstrated. This occurred primarily because a portion of the creek was oversprayed. The creek itself is about 2 feet wide, a few inches deep, about 4 miles long, and covered by brush and trees. The other two creeks, Rito la Cueva and Trail, were not adversely affected by the carbaryl application, although some carbaryl drift occurred in the upper reaches of Trail Creek, causing a minor die-off of aquatic insects. Data will not be presented for these two creeks.

In 1977, the aquatic invertebrate fauna of San Pablo Creek was reduced by the carbaryl overspray. Because of this impact on the aquatic environment, a follow-up investigation was made in June of 1978, 1 year after the overspray. Sampling was done to determine if the most seriously affected groups of aquatic insects would be present. For comparison purposes, Table 4 shows the effects of the carbaryl overspray of San Pablo Creek on Treatment Day in 1977 for both drift and Surber samples. Data obtained for drift and Surber samples are also presented for each study period. These data indicate what occurred at one site on the stream where samples were taken.

The impact of the carbaryl overspray is quite obvious for those samples obtained on Treatment Day. The number of drift organisms noted represents the total number of organisms collected from two 10-minute drift samples taken at 7:30 and 8:00 a.m. MDT, the peak of the drift increase. Part of the creek was oversprayed between 6:00 and 6:30 a.m. MDT. Analyses of these drift samples indicated that the most severely affected insects were mayflies of the families Baetidae and Heptageniidae, Plecoptera nymphs of the families Chloroperlidae and Nemouridae, Trichoptera larvae of the families Lepidostomatidae and Limnephilidae, and Diptera larvae of the family Tipulidae.

On Treatment Day, one Surber sample was taken from San Pablo Creek at 1:00 p.m. MDT. The analysis of this sample indicated a total of 215 organisms representing all groups of insects that were also present in the Pretreatment sample. This was possibly not a representative sample, however, as the high number of organisms collected may have been the result of placing the sampler over an area that contained insects that died earlier in the day and had settled to the bottom.

5/ Report prepared by Harry Kennedy, U. S. Fish and Wildlife Service, Albuquerque, NM.

Table 4.--Numerical comparison of aquatic insect drift and Surber square foot samples from San Pablo Creek for Pretreatment and Treatment Days of 1977, and follow up samples obtained in June of 1978, Santa Fe National Forest, New Mexico.

	10 Minute Drift Samples			Surber Bottom Samples		
	1/ Pretreatment	2/ Treatment Day	1/ One Year Later	3/ Pretreatment	3/ Treatment Day	3/ One Year Later
ORGANISM	June 1977	June 1977	June 1978	June 1977	June 1977	June 1978
EPHEMEROPTERA						
Baetidae	4	355	1		25	3
Heptageniidae		110			7	3
Siphlonuridae		4				
PLECOPTERA						
Chloroperlidae	2	84		2		
Nemouridae	1	2748		35	7	
Perlidae		1			56	
Perlodidae		6				
HEMIPTERA						
Veliidae	1		1			2
TRICHOPTERA						
Lepidostomatidae		98		6		
Lemnephilidae	2	50		2	1	
COLEOPTERA						
Hydroscapidae						11
Elmidae		6		61	48	23
DIPTERA						
Chironomidae	1	13	1	10	52	31
Dixidae		15		1		
Simulidae	3	22				12
Stratiomyidae				10	7	
Tipulidae		194		5	1	3
COLLEMBOLA						1
ACARI					1	6
TURBELLARIA	1	4	21	10	10	64
UNIDENTIFIED		4	2			22
TOTALS	15	3714	26	142	215	181

1/ Total number of organisms from two 10 minute drift samples taken at 7:30 a.m. and 8:00 a.m. MDT.
2/ Total number of organisms from two 10 minute drift samples taken at 7:30 and 8:00 a.m. MDT.
3/ Total number of organisms collected from one Surber sample taken at 1:00 p.m. MDT for each sampling period.

From the analyses of drift and Surber samples obtained in June of 1978, there is an indication that three families of aquatic insects may not have recovered, namely Chloroperlidae and Nemouridae of the order Plecoptera, and Stratiomyidae of the order Diptera. It appears that the other groups of insects, though affected by the carbaryl, had reestablished themselves to their normal population density. Overall, the insect biomass appears to be comparable for both years. The number of Planaria, Tubellaria, increased from 1977 to 1978. Planaria were also more numerous in Surber samples for the 2 years; 10 from the Pretreatment sample in June of 1977 to 64 in June of 1978.

Additional samples will be taken at several sites on San Pablo Creek in 1979 to determine if the families of aquatic insects that did not appear in the 1978 samples were completely eliminated, or only temporarily affected. Because of various physical limitations (sample size, climatic conditions, or sampling techniques), it is not possible to definitely say that these affected groups of insects no longer form a part of the insect fauna of San Pablo Creek.

2. Birds, Small Mammals, Reptiles, and Non-target Terrestrial Insects

a. Birds

In total, 25 species of breeding birds were observed in 1978, compared with 40 species observed in 1977. The 15 species not encountered in 1978 are all uncommon; thus, our census data may simply reflect the shorter period of time spent in the field in 1978. The total breeding bird density was 161.7 pairs/40 ha, not significantly different from the densities encountered in 1977.

When the transect was censused in 1977, the weather was clear, while we encountered rain on all but one census period in 1978. Birds are often less active under rainy or cloudy conditions; thus, the adverse weather may have influenced our data.

While the total number of pairs/ha was near the 1977 levels, some species densities changed considerably (Table 5). There are insufficient data to determine whether these changes were a result of the carbaryl treatment or natural population fluctuations.[6/]

Data from 1977 and 1978 breeding bird surveys in the Jemez Mountains did not indicate significant changes in the avian population that could be directly linked to the carbaryl

6/ Balda, R. P. 1975. Proceedings of the symposium on management of forest and range habitats for nongame birds. USDA Forest Serv., Gen. Tech. Rep., WO-1.

Table 5.--Breeding birds on Smokey Bear Hill Road study site, pairs/40 ha, Santa Fe National Forest, New Mexico.

SPECIES	1977	1978
Broad-tailed Hummingbird *Selasphorus platycercus*	3.3	8.8
Red-shafted Flicker *Colaptes auratus*	3.7	3.7
Williamson's Sapsucker *Sphyrapicus thyroideus*	4.7	5.6
Hairy Woodpecker *Dendrocopos villosus*	1.5	*
Empidonax Flycatcher *Empidonax* sp.	2.8	2.8
Western Wood Pewee *Contopus sordidulus*	6.1	6.1
Steller's Jay *Cyanocitta stelleri*	2.8	2.8
Common Raven *Corvus corax*	0.5	*
Clark's Nutcracker *Nucifraga columbiana*	3.3	*
Mountain Chickadee *Parus gambeli*	7.9	23.7
White-breasted Nuthatch *Sitta carolinensus*	0.5	0.5
Red-breasted Nuthatch *Sitta canadensis*	3.3	1.7
House Wren *Troglodytes aedon*	23.3	22.6
Robin *Turdus migratorius*	11.2	5.9
Hermit Thrush *Catharus guttata*	8.4	6.7

Table 5.--continued

SPECIES	1977	1978
Western Bluebird *Sialia mexicana*	0.9	0.9
Townsend's Solitaire *Myadestes townsendi*	1.4	1.4
Golden-crowned Kinglet *Regulus satrapa*	1.4	*
Ruby-crowned Kinglet *Regulus calendula*	18.2	25.1
Warbling Vireo *Vireo gilvus*	42.0	25.2
Audubon's Warbler *Dendroica coronata*	10.7	6.7
Western Tanager *Piranga ludoviciana*	0.5	1.0
Evening Grosbeak *Hesperiphona vespertina*	0.9	*
Gray-headed Junco *Junco hyemalis*	8.9	9.9
Chipping Sparrow *Spizella passerina*	2.8	0.6

* Not observed in 1978.

treatment. It is important to note, however, that the study design was not sensitive enough to measure other than large changes in the breeding bird densities, i.e., massive reductions in numbers of adult and juvenile birds and complete failure of nests.

b. Small Mammals

The results of the small mammal trapping in June-July 1978 are given in Tables 6 and 7, along with the June 1977 results for comparison. The method detected no immediate effects of the spray treatment in 1977. In the 1978 sampling, the size as well as the diversity of the overall catch increased at both the sprayed and unsprayed sites. There is no evidence in these data that would indicate that the carbaryl spraying had an adverse effect on small mammal populations.

3. Insect Parasites of the Western Spruce Budworm

Parasitism rates for 1977 and 1978 are presented in Tables 8 and 9. Only Apanteles fumiferanae Viereck, Glypta fumiferanae (Viereck), and Ceromasia auricaudata Townsend were abundant enough for yearly comparison. Other species were relatively rare and not comparable. A. fumiferanae parasitism on early budworm instars increased or remained static from 1977 to 1978 in the sprayed subunits, while it substantially decreased in unsprayed subunits (Table 8). G. fumiferanae, on the other hand, shows a decrease in most sprayed subunits, while the change in percent parasitism is mixed in unsprayed subunits. Comparing the percent parasitism in Table 9, it is evident that a similar trend occurs for both parasite species on budworm larvae in latter instars. These data have not been analyzed statistically as yet, but it appears that the percent parasitism for A. fumiferanae was not detrimentally affected, and may have increased due to the treatment program. Spraying may have reduced G. fumiferanae parasitism. The most significant reduction in percent parasitism is evident for C. auricaudata (Table 9) in the treatment area.

IV. PLAN FOR F.Y. 1979

Evaluation of the effectiveness of suppression 2 years following treatment is planned for F.Y. 1979. Entomological and tree damage sampling methods will be the same as those described in Sections II. A. and B. Total costs are expected to be $69,157: $49,000 project funding and $19,957 base funding. A F.Y. 1979 financial plan follows:

Table 6. Results of small mammal trapping in the sprayed area during 1978 compared with the 1977 trapping, Smokey Bear Hill Road, Bales Canyon, Santa Fe National Forest, New Mexico.

	1977						1978		
	Pre-Spray Period			Post-Spray Period			One Year After Spraying		
	8 June	9 June	10 June	22 June	23 June	24 June	26 June	27 June	28 June
Peromyscus maniculatus	4	3	3	5	0	2	15	4	4
Eutamias minimus	2	0	1	0	2	0	0	11	6
Microtus longicaudus	0	0	0	0	0	0	2	2	1
Microtus montarius	0	0	0	0	0	0	0	0	1
Eutamias quadrivittatus	0	0	0	0	0	0	0	0	2
Total Indivuduals	13			12			48		

Table 7. Results of small mammal trapping in the unsprayed area during 1978 compared with the 1977 trapping, 4.5 miles northeast of Porter's Landing, Lake Fork Canyon, Santa Fe National Forest, New Mexico.

	1977			1978		
	11 June	12 June	13 June	3 July	4 July	5 July
Peromyscus maniculatus	5	0	2	9	2	1
*Eutamias quadrivittatus**	0	2	0	2	4	0
Peromyscus truei	0	0	0	1	0	0
Spermophilus lateralis	0	0	0	0	1	0
Total Individuals	9			20		

*Corrected identification from 1977 report.

Table 8. Percent parasitism comparison of 1977 and 1978 rates when budworm larvae are in the early instars, Santa Fe National Forest, New Mexico.

Subunit No.	Apanteles			Glypta		
	1977	1978	Diff	1977	1978	Diff
1	12	9	-3	11	2	-9
2	23	47	+24	8	2	-6
3	23	20	-3	11	2	-9
4	15	20	+5	5	4	-1
5	11	51	+40	4	3	-1
6	23	24	+1	12	1	-11
7	11	4	-7	3	4	+1
8	12	8	-4	24	16	-8
9	15	11	-4	21	20	-1
10	34	6	-28	22	15	-7
11	21	8	-13	4	13	+9
12	22	10	-12	10	25	+15

Table 9.--Percent parasitism comparison of 1977 and 1978 rates when budworm larvae are in the late instars, Santa Fe National Forest, New Mexico.

Subunit No.	Apanteles			Glypta			Ceromasia			Unk. Tachinids		Phytodietus	
	1977	1978	Diff	1977	1978	Diff	1977	1978	Diff	1977	1978	1977	1978
1	0	0	0	6	2	-4	24	0	-24	3	6	1	2
2	0	<1	+<1	3	2	-1	11	3	-8	12	5	0	5
3	1	0	-1	3	2	-1	20	8	-12	10	12	1	0
4	0	0	0	3	3	0	29	3	-26	4	3	0	2
5	1	11	+10	4	4	0	25	0	-25	8	4	0	<1
6	1	<1	-<1	6	3	-3	2	2	0	3	17	0	1
7	0	1	+1	2	4	+2	0	<1	+<1	0	<1	0	2
8	1	2	+1	29	20	-9	8	11	+3	2	7	0	1
9	6	6	0	16	24	+8	7	4	-3	3	7	0	<1
10	5	3	-2	12	18	+6	10	6	-4	5	7	0	3
11	5	2	-3	14	26	+12	5	3	-2	4	9	0	0
12	3	3	0	14	12	-2	16	4	-12	3	7	0	3

		1979 Project Funding	R-3 Base Funding	Total
A.	Vehicles			
1.	4, 1/2-ton pickups, 4-speed, 4X2, 6-cylinder, with 2,000 miles of use per month for 3.5 months at $350.00 per vehicle per month	$ 5,600	$ 0	$ 5,600
2.	Gasoline receipts for 4 vehicles at $250.00 per month	1,000	0	1,000
3.	1, 1/2-ton pickup, 4-speed, 4X4, 8-cylinder, with 2,000 miles of use per month for 3.5 months at $70.50 per month and $0.125 per mile	0	1,125	1,125
4.	1, 1/2-ton pickup, 4-speed, 4X2, 8-cylinder, with 2,000 miles per month for 3.5 months at $55.00 per month and $0.10 per mile	0	892	892
	Subtotal	$ 6,600	$ 2,017	$ 8,617
B.	Equipment and Supplies			
1.	Field sampling and laboratory equipment (tree paint, alcohol preservative, map copying, printing, etc.)	$ 800	$ 0	$ 800
2.	Trailer rental for lab space	700	0	700
3.	Seligman Girl Scout Camp, or other facility, leasing for 3.5 months	2,000	0	2,000
	Subtotal	$ 3,500	$ 0	$ 3,500

		1979 Project Funding	R-3 Base Funding	Total
C.	Personnel			
1.	2 subunit leaders, GS-404-5, temporary position for project (95 days at $40.24 per day)	$ 7,700	$ 0	$ 7,700
2.	6 crew members, GS-404-4, temporary position for project (95 days at $35.95 per day)	20,500	0	20,500
3.	2 crew members, GS-404-4, temporary position with FIDM, (50 days at $35.95 per day)	0	3,600	3,600
4.	Field and laboratory leader, GS-404-5 (95 days at $44.27 per day)	0	4,200	4,200
5.	Project entomologist, GS-414-11 (95 days at $78.62 per day)	0	7,500	7,500
	Subtotal	$28,200	$15,300	$43,500
D.	Administrative			
1.	Per diem for 8 project temporaries ($10/day camp rate for 70 days)	$ 5,600	$ 0	$ 5,600
2.	Per diem for 2 FIDM temporaries $10/day camp rate for 25 days)	500	0	500

		1979 Project Funding	R-3 Base Funding	Total
3.	Per diem for 2 FIDM permanents (Gene & Mike, $10/day camp rate for 70 days)	0	1,400	1,400
4.	Overtime for pre-spray sampling (10-hour days for 10 straight days including 2 weekends for 12 people)	2,200	740	2,940
	Subtotal	$ 8,300	$ 2,140	$10,440
E.	Service			
1.	Data Analysis	$ 0	$ 500	$ 500
2.	Overhead (R-3 at about 5 percent in F.Y. 1979)	2,400	0	2,400
	Subtotal	$ 2,400	$ 500	$ 2,900
	GRAND TOTAL	$49,000	$19,957	$69,157

Environmental monitoring will be continued in 1979 for aquatic organisms and insect parasites of the budworm. Sampling of aquatic organisms in San Pablo Creek will be done to determine if insect species, reduced by the accidental overspraying, have returned. The work to determine the percent parasitism in treatment and untreated check areas will be done for a third year.

Finally, plans are being made to continue evaluating the long-term effects of suppression in 1980, and in future years, until the budworm outbreak collapses, if funding can be obtained. Sampling probably will not be as intensive as planned for the first 3 years of the project, unless it is determined that detailed data are needed for studies for CANUSA[7/] or other programs. In this case, CANUSA personnel and/or other cooperators would participate with Regional personnel.

7/ CANUSA, Canada/U.S. Spruce Budworms Program--West, Pacific Northwest Forest and Range Exp. Sta., P.O. Box 3141, Portland, Oregon 97208.

V. APPENDIX

An explanation of information presented on data summary sheets follows:

A. Cluster numbering system: cluster 1 = trees 1, 2, and 3; cluster 4 = trees 4, 5, and 6; etc.

B. Larval densities per 100 buds is on Douglas-fir.

C. Host codes: 1 = Douglas-fir, 3 = white fir.

D. Egg mass data: Good, less than 50 percent of eggs parasitized; bad, more than 50 percent of eggs parasitized.

E. Refer to Progress Report No. 1 (footnote 1) for an explanation of the 4-class defoliation system.

A. Unanalyzed Larval Density Data - 1977 & 1978

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME SAN MIGUEL SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
1	1	24.28	.00	.00	24.28
1	4	12.93	.00	.00	12.93
1	7	13.43	.00	.00	13.43
1	10	15.87	.00	.00	15.87
1	13	13.46	.00	.00	13.46
1	16	26.19	.00	.00	26.19
1	19	32.73	.00	.00	32.73
1	22	32.32	.00	.00	32.32
1	25	7.28	.00	.00	7.28
1	28	17.32	.00	.00	17.32
1	31	26.40	.00	.00	26.40
1	34	9.01	.00	.00	9.01
1	37	26.35	.00	.00	26.35
1	40	10.94	.00	.00	10.94
1	43	21.83	.00	.00	21.83
1	46	35.71	.57	.00	36.29
1	49	17.69	.00	.00	17.69
1	52	34.84	.00	.00	34.84
1	55	22.73	.00	.00	22.73
1	58	18.23	.00	.00	18.23
1	61	5.08	.00	.00	5.08
1	64	8.07	.00	.00	8.07
1	67	59.24	.00	.00	59.24
1	70	12.79	.00	.00	12.79
1	73	5.99	.00	.00	5.99
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		20.429	.023	.000	20.452
STANDARD ERRORS		2.453	.023	.000	2.459
VARIANCE		150.5	.0	.0	151.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME JOAQUIN SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
2	76	3.47	.00	.00	3.47
2	79	7.39	.00	.00	7.39
2	82	.00	.00	.00	.00
2	85	2.78	.00	.00	2.78
2	88	3.33	.00	.00	3.33
2	91	30.06	.00	.00	30.06
2	94	4.52	.00	.00	4.52
2	97	23.64	.00	.00	23.64
2	100	9.94	.00	.00	9.94
2	103	.42	.00	.00	.42
2	106	28.00	.00	.00	28.00
2	109	10.62	.00	.00	10.62
2	112	19.07	.00	.00	19.07
2	115	7.65	.00	.00	7.65
2	118	13.01	.00	.00	13.01
2	121	18.22	.00	.00	18.22
2	124	7.12	.00	.00	7.12
2	127	25.38	.00	.00	25.38
2	130	.83	.00	.00	.83
2	133	1.72	.00	.00	1.72
2	136	3.11	.00	.00	3.11
2	139	12.98	.00	.00	12.98
2	142	39.78	.00	.00	39.78
2	145	10.38	.00	.00	10.38
2	148	14.61	.00	.00	14.61
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		11.921	.000	.000	11.921
STANDARD ERRORS		2.127	.000	.000	2.127
VARIANCE		113.1	.0	.0	113.1

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME SMOKEY BEAR SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
3	151	19.16	.00	.00	19.16
3	154	19.53	.00	.00	19.53
3	157	19.44	.00	.00	19.44
3	160	7.46	.00	.00	7.46
3	163	11.24	.00	.00	11.24
3	166	3.01	.00	.00	3.01
3	169	6.40	.00	.00	6.40
3	172	12.49	.00	.00	12.49
3	175	25.44	.00	.00	25.44
3	178	9.10	.00	.00	9.10
3	181	31.84	.00	.00	31.84
3	184	5.10	.00	.00	5.10
3	187	28.81	.00	.00	28.81
3	190	10.55	.00	.00	10.55
3	193	3.29	.00	.00	3.29
3	196	.67	.00	.00	.67
3	199	5.27	.00	.00	5.27
3	202	.00	.00	.00	.00
3	205	20.84	.95	.00	21.80
3	208	2.47	.00	.00	2.47
3	211	8.67	.00	.00	8.67
3	214	13.50	.00	.00	13.50
3	217	10.69	.00	.00	10.69
3	220	8.28	.00	.00	8.28
3	223	8.17	.00	.00	8.17
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		11.656	.038	.000	11.695
STANDARD ERRORS		1.739	.038	.000	1.748
VARIANCE		75.6	.0	.0	76.4

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME TRAIL SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
4	226	13.12	.00	.00	13.12
4	229	2.78	.00	.00	2.78
4	232	7.93	.00	.00	7.93
4	235	2.01	.00	.00	2.01
4	238	.43	.00	.00	.43
4	241	28.03	.00	.00	28.03
4	244	34.19	.00	.00	34.19
4	247	26.04	.00	.00	26.04
4	250	11.01	.00	.00	11.01
4	253	8.76	.00	.00	8.76
4	256	16.15	.00	.00	16.15
4	259	24.63	.00	.00	24.63
4	262	18.04	.00	.00	18.04
4	265	38.92	.00	.00	38.92
4	268	35.69	.00	.00	35.69
4	271	20.75	.00	.00	20.75
4	274	17.37	1.62	.00	19.00
4	277	21.51	.00	.00	21.51
4	280	10.69	.00	.00	10.69
4	283	30.43	.00	.00	30.43
4	286	9.52	.00	.00	9.52
4	289	26.63	.00	.00	26.63
4	292	27.52	.00	.00	27.52
4	295	8.56	.00	.00	8.56
4	298	5.86	.00	.00	5.86
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		17.863	.065	.000	17.928
STANDARD ERRORS		2.229	.065	.000	2.230
VARIANCE		124.2	.1	.0	124.3

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME BLUE BIRD SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
5	301	2.21	.00	.00	2.21
5	304	4.60	.00	.00	4.60
5	307	6.18	.00	.00	6.18
5	310	1.06	.00	.00	1.06
5	313	.00	.00	.00	.00
5	316	16.78	.00	.00	16.78
5	319	18.67	.00	.00	18.67
5	322	10.65	.00	.00	10.65
5	325	4.68	.00	.00	4.68
5	328	33.37	.00	.00	33.37
5	331	20.63	.00	.00	20.63
5	334	22.67	.00	.00	22.67
5	337	21.02	.00	.00	21.02
5	340	30.45	.00	.00	30.45
5	343	30.63	.00	.00	30.63
5	346	20.08	.00	.00	20.08
5	349	33.91	.00	.00	33.91
5	352	25.92	.00	.00	25.92
5	355	19.01	.00	.00	19.01
5	358	54.77	.00	.00	54.77
5	361	29.10	.00	.00	29.10
5	364	36.57	.00	.00	36.57
5	367	5.62	.00	.00	5.62
5	370	4.43	.00	.00	4.43
5	373	1.51	.00	.00	1.51
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		18.180	.000	.000	18.180
STANDARD ERRORS		2.814	.000	.000	2.814
VARIANCE		198.0	.0	.0	198.0

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME RED TOP SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
6	376	5.62	.00	.00	5.62
6	379	6.55	.00	.00	6.55
6	382	5.15	.00	.00	5.15
6	385	9.19	.00	.00	9.19
6	388	14.58	.00	.00	14.58
6	391	10.29	.00	.00	10.29
6	394	14.06	.00	.00	14.06
6	397	14.98	.00	.00	14.98
6	400	9.51	.00	.00	9.51
6	403	9.94	.00	.00	9.94
6	406	9.36	.00	.00	9.36
6	409	3.08	.00	.00	3.08
6	412	7.40	.00	.00	7.40
6	415	15.80	.00	.00	15.80
6	418	19.97	.00	.00	19.97
6	421	7.11	.00	.00	7.11
6	424	8.73	.00	.00	8.73
6	427	21.82	.00	.00	21.82
6	430	8.81	.00	.00	8.81
6	433	4.77	.00	.00	4.77
6	436	5.89	.00	.00	5.89
6	439	2.44	.00	.00	2.44
6	442	4.41	.00	.00	4.41
6	445	.83	.00	.00	.83
6	448	3.51	.00	.00	3.51
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		8.952	.000	.000	8.952
STANDARD ERRORS		1.071	.000	.000	1.071
VARIANCE		28.7	.0	.0	28.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME OJITOS SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
7	451	1.39	.00	.00	1.39
7	454	4.66	.00	.00	4.66
7	457	1.34	.00	.00	1.34
7	460	4.31	.00	.00	4.31
7	463	3.98	.00	.00	3.98
7	466	5.00	.00	.00	5.00
7	469	2.95	.00	.00	2.95
7	472	2.38	.00	.00	2.38
7	475	.79	.00	.00	.79
7	478	1.94	1.11	.00	3.05
7	481	7.72	.00	.00	7.72
7	484	2.05	.79	.00	2.85
7	487	2.57	.00	.00	2.57
7	490	1.85	.00	.00	1.85
7	493	7.92	.00	.00	7.92
7	496	3.91	.00	.00	3.91
7	499	2.13	.00	.00	2.13
7	502	1.75	.00	.00	1.75
7	505	1.45	.00	.00	1.45
7	508	2.50	.00	.00	2.50
7	511	.46	.00	.00	.46
7	514	.98	.00	.00	.98
7	517	.83	.00	.00	.83
7	520	.52	.00	.00	.52
7	523	.00	.00	.00	.00
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		2.616	.076	.000	2.692
STANDARD ERRORS		.413	.054	.000	.412
VARIANCE		4.3	.1	.0	4.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME LAKE FORK SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
8	526	1.72	.00	.00	1.72
8	529	5.41	.00	.00	5.41
8	532	.67	.00	.00	.67
8	535	10.33	.00	.00	10.33
8	538	.60	.00	.00	.60
8	541	1.69	.00	.00	1.69
8	544	3.41	.00	.00	3.41
8	547	5.59	.00	.00	5.59
8	550	2.48	.00	.00	2.48
8	553	10.42	.00	.00	10.42
8	556	15.73	.00	.00	15.73
8	559	17.88	.00	.00	17.88
8	562	12.63	.00	.00	12.63
8	565	19.94	.00	.00	19.94
8	568	18.69	.00	.00	18.69
8	571	10.87	.00	.00	10.87
8	574	4.54	.00	.00	4.54
8	577	42.32	.00	.00	42.32
8	580	9.69	.00	.00	9.69
8	583	7.75	.00	.00	7.75
8	586	1.49	.00	.00	1.49
8	589	2.46	.00	.00	2.46
8	592	4.85	.00	.00	4.85
8	595	12.42	.00	.00	12.42
8	598	14.36	.00	.00	14.36
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		9.517	.000	.000	9.517
STANDARD ERRORS		1.819	.000	.000	1.819
VARIANCE		82.7	.0	.0	82.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME COCHITI SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
9	601	5.46	.00	.00	5.46
9	604	1.77	.00	.00	1.77
9	607	15.66	.67	.00	16.33
9	610	7.38	.00	.00	7.38
9	613	3.28	.00	.00	3.28
9	616	1.07	.00	.00	1.07
9	619	1.52	.00	.00	1.52
9	622	9.78	.00	.00	9.78
9	625	7.81	.00	.00	7.81
9	628	4.82	.00	.00	4.82
9	631	5.39	.00	.00	5.39
9	634	3.20	.00	.00	3.20
9	637	24.36	.00	.00	24.36
9	640	7.26	.00	.00	7.26
9	643	13.35	.00	.00	13.35
9	646	12.35	.00	.00	12.35
9	649	5.70	.00	.00	5.70
9	652	11.59	.00	.00	11.59
9	655	15.01	.00	.00	15.01
9	658	29.33	.00	.00	29.33
9	661	5.81	.00	.00	5.81
9	664	16.22	.00	.00	16.22
9	667	8.30	.00	.00	8.30
9	670	.00	.00	.00	.00
9	673	.46	.00	.00	.46
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		8.675	.027	.000	8.702
STANDARD ERRORS		1.466	.027	.000	1.466
VARIANCE		53.3	.0	.0	53.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME CAPULIN SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
10	676	17.45	.00	.00	17.45
10	679	38.26	.00	.00	38.26
10	682	20.36	.00	.00	20.36
10	694	5.98	.00	.00	5.98
10	697	4.63	.00	.00	4.63
10	700	14.10	.00	.00	14.10
10	703	27.98	.00	.00	27.98
10	706	46.20	.00	.00	46.20
10	709	47.20	.00	.00	47.20
10	712	18.65	.00	.00	18.65
10	715	10.57	.00	.00	10.57
10	718	13.66	.00	.00	13.66
10	721	31.05	.00	.00	31.05
10	724	16.40	.00	.00	16.40
10	727	27.28	.00	.00	27.28
10	730	8.58	.00	.00	8.58
10	733	.75	.00	.00	.75
10	736	6.18	.00	.00	6.18
10	739	1.20	.00	.00	1.20
10	742	2.72	.00	.00	2.72
10	745	9.42	.00	.00	9.42
10	748	11.32	.00	.00	11.32
NUMBER OF CLUSTERS		22.			
BLOCK MEANS		17.269	.000	.000	17.269
STANDARD ERRORS		2.937	.000	.000	2.937
VARIANCE		189.7	.0	.0	189.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME AMERICAN SPRINGS SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
11	751	12.86	.00	.00	12.86
11	754	26.65	.93	.00	27.58
11	757	22.92	.00	.00	22.92
11	760	29.85	.00	.00	29.85
11	763	18.12	.00	.00	18.12
11	766	7.27	.00	.00	7.27
11	769	31.01	.00	.00	31.01
11	772	9.74	.00	.00	9.74
11	775	5.21	.00	.00	5.21
11	778	.00	.00	.00	.00
11	781	1.83	.00	.00	1.83
11	784	1.25	.00	.00	1.25
11	787	9.09	.00	.00	9.09
11	790	10.74	.00	.00	10.74
11	793	7.96	.00	.00	7.96
11	796	1.45	.00	.00	1.45
11	799	1.85	.00	.00	1.85
11	802	1.16	.00	.00	1.16
11	805	1.03	.00	.00	1.03
11	808	16.36	.00	.00	16.36
11	811	2.51	.00	.00	2.51
11	814	28.94	.00	.00	28.94
11	817	21.05	.00	.00	21.05
11	820	16.89	.00	.00	16.89
11	823	27.15	.00	.00	27.15
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		12.515	.037	.000	12.552
STANDARD ERRORS		2.118	.037	.000	2.128
VARIANCE		112.1	.0	.0	113.3

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME LOS ALAMOS SURVEY PERIOD 1977 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
12	826	35.12	.00	.00	35.12
12	829	.00	.00	.00	.00
12	832	3.10	.00	.00	3.10
12	835	5.95	.00	.00	5.95
12	838	3.43	.00	.00	3.43
12	841	17.90	.00	.00	17.90
12	844	22.21	.00	.00	22.21
12	847	20.51	.00	.00	20.51
12	850	13.03	.00	.00	13.03
12	853	17.34	.00	.00	17.34
12	856	36.66	.00	.00	36.66
12	859	28.32	.00	.00	28.32
12	862	18.90	.00	.00	18.90
12	865	12.98	.00	.00	12.98
12	868	10.90	.00	.00	10.90
12	871	9.33	.00	.00	9.33
12	874	15.68	.00	.00	15.68
12	877	16.06	3.46	.00	19.52
12	880	.00	.00	.00	.00
12	883	1.23	.00	.00	1.23
12	886	1.46	.00	.00	1.46
12	889	4.83	.00	.00	4.83
12	892	5.82	.00	.00	5.82
12	895	20.28	.00	.00	20.28
12	898	33.27	.00	.00	33.27
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		14.174	.138	.000	14.312
STANDARD ERRORS		2.211	.138	.000	2.221
VARIANCE		122.3	.5	.0	123.3

NORMAL END OF JOB!!!!!!

$BRKPT PRINT$

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME SAN MIGUEL SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
1	1	.29	.00	.00	.29
1	4	.46	.00	.00	.46
1	7	5.75	.00	.00	5.75
1	10	1.04	.00	.00	1.04
1	13	.00	.00	.00	.00
1	16	.45	.00	.00	.45
1	19	.28	.00	.00	.28
1	22	1.42	.00	.00	1.42
1	25	.00	.00	.00	.00
1	28	1.04	.00	.00	1.04
1	31	.33	.00	.00	.33
1	34	.76	.00	.00	.76
1	37	.15	.00	.00	.15
1	40	.75	.00	.00	.75
1	43	.83	.00	.00	.83
1	46	1.05	.00	.00	1.05
1	49	.91	.00	.00	.91
1	52	.29	.00	.00	.29
1	55	.84	.00	.00	.84
1	58	6.09	.00	.00	6.09
1	61	.33	.00	.00	.33
1	64	.00	.00	.00	.00
1	67	.68	.00	.00	.68
1	70	1.22	.00	.00	1.22
1	73	6.29	.00	.00	6.29
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		1.250	.000	.000	1.250
STANDARD ERRORS		.370	.000	.000	.370
VARIANCE		3.4	.0	.0	3.4

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME JOAQUIN SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
2	76	.67	.00	.00	.67
2	79	.00	.00	.00	.00
2	82	.00	.00	.00	.00
2	85	1.28	.00	.00	1.28
2	88	.33	.00	.00	.33
2	91	.97	.40	.00	1.36
2	94	.93	.00	.00	.93
2	97	.00	.00	.00	.00
2	100	.98	.00	.00	.98
2	103	.00	.00	.00	.00
2	106	.35	.00	.00	.35
2	109	.54	.00	.00	.54
2	112	.00	.00	.00	.00
2	115	.00	.00	.00	.00
2	118	.66	.00	.00	.66
2	121	.72	.00	.00	.72
2	124	.00	.00	.00	.00
2	127	.46	.00	.00	.46
2	130	.00	.00	.00	.00
2	133	.00	.00	.00	.00
2	136	1.42	.00	.00	1.42
2	139	.00	.00	.00	.00
2	142	.00	.00	.00	.00
2	145	.89	.00	.00	.89
2	148	.35	.00	.00	.35
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		.422	.016	.000	.438
STANDARD ERRORS		.091	.016	.000	.097
VARIANCE		.2	.0	.0	.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME SMOKEY BEAR SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
3	157	.23	.00	.00	.23
3	160	.00	.00	.00	.00
3	163	.00	.00	.00	.00
3	166	.00	.00	.00	.00
3	169	.00	.00	.00	.00
3	172	1.49	.00	.00	1.49
3	175	.52	.00	.00	.52
3	178	.32	.00	.00	.32
3	184	1.29	.00	.00	1.29
3	190	.60	.00	.00	.60
3	193	1.32	.00	.00	1.32
3	196	.00	.00	.00	.00
3	199	1.60	.00	.00	1.60
3	202	.00	.00	.00	.00
3	208	.00	.00	.00	.00
3	211	.00	.00	.00	.00
3	214	.00	.00	.00	.00
3	217	.00	.00	.00	.00
3	220	1.05	.00	.00	1.05
3	223	.00	.00	.00	.00
NUMBER OF CLUSTERS		20.			
BLOCK MEANS		.421	.000	.000	.421
STANDARD ERRORS		.131	.000	.000	.131
VARIANCE		.3	.0	.0	.3

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME TRAIL SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
4	226	.62	.00	.00	.62
4	229	.00	.00	.00	.00
4	232	1.37	.00	.00	1.37
4	235	.72	.00	.00	.72
4	238	.00	.00	.00	.00
4	241	.69	.00	.00	.69
4	244	.30	.00	.00	.30
4	247	.00	.00	.00	.00
4	250	1.02	.00	.00	1.02
4	253	2.79	.00	.00	2.79
4	256	.00	.00	.00	.00
4	259	.00	.00	.00	.00
4	262	.00	.00	.00	.00
4	265	1.14	.00	.00	1.14
4	268	.00	.00	.00	.00
4	271	.00	.00	.00	.00
4	274	2.21	.00	.00	2.21
4	277	2.27	.00	.00	2.27
4	280	3.61	.00	.00	3.61
4	283	.00	.00	.00	.00
4	286	.27	.00	.00	.27
4	289	.20	.00	.00	.20
4	292	.85	.00	.00	.85
4	295	1.39	.00	.00	1.39
4	298	9.43	.00	.00	9.43
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		1.155	.000	.000	1.155
STANDARD ERRORS		.398	.000	.000	.398
VARIANCE		4.0	.0	.0	4.0

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME BLUE BIRD SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
5	301	.76	.00	.00	.76
5	304	3.04	.00	.00	3.04
5	307	1.19	.00	.00	1.19
5	310	.00	.00	.00	.00
5	313	.88	.00	.00	.88
5	316	2.50	.00	.00	2.50
5	319	.00	.00	.00	.00
5	322	.36	.00	.00	.36
5	325	.37	.00	.00	.37
5	328	.17	.00	.00	.17
5	331	.49	.00	.00	.49
5	334	.00	.00	.00	.00
5	337	.75	.00	.00	.75
5	340	1.08	.00	.00	1.08
5	343	.98	.00	.00	.98
5	346	2.81	.00	.00	2.81
5	349	.00	.00	.00	.00
5	352	.57	.00	.00	.57
5	355	1.28	.00	.00	1.28
5	358	.00	.00	.00	.00
5	361	18.03	.00	.00	18.03
5	364	2.34	.00	.00	2.34
5	367	.00	.00	.00	.00
5	370	.00	.00	.00	.00
5	373	.00	.00	.00	.00
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		1.504	.000	.000	1.504
STANDARD ERRORS		.713	.000	.000	.713
VARIANCE		12.7	.0	.0	12.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME RED TOP SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
6	376	.00	.00	.00	.00
6	379	.79	.00	.00	.79
6	382	.25	.00	.00	.25
6	385	.23	.00	.00	.23
6	388	2.78	.00	.00	2.78
6	391	.54	.00	.00	.54
6	394	.00	.00	.00	.00
6	397	.33	.00	.00	.33
6	400	.00	.00	.00	.00
6	403	.00	.00	.00	.00
6	406	.00	.00	.00	.00
6	409	.31	.00	.00	.31
6	412	.00	.00	.00	.00
6	415	.00	.00	.00	.00
6	418	1.76	.00	.00	1.76
6	421	.00	.00	.00	.00
6	424	.40	.00	.00	.40
6	427	.00	.00	.00	.00
6	430	1.93	.00	.00	1.93
6	433	.93	.00	.00	.93
6	436	2.47	.00	.00	2.47
6	439	.00	.00	.00	.00
6	442	.00	.00	.00	.00
6	445	1.04	.00	.00	1.04
6	448	.00	.00	.00	.00
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		.550	.000	.000	.550
STANDARD ERRORS		.165	.000	.000	.165
VARIANCE		.7	.0	.0	.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME OJITOS SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
7	451	.00	.00	.00	.00
7	454	2.29	.00	.00	2.29
7	457	4.33	.00	.00	4.33
7	460	5.55	.00	.00	5.55
7	463	4.45	.00	.00	4.45
7	466	2.53	.00	.00	2.53
7	469	2.17	.00	.00	2.17
7	472	.42	.00	.00	.42
7	475	1.87	.00	.00	1.87
7	478	4.33	.00	.00	4.33
7	481	6.73	.00	.00	6.73
7	484	1.11	.00	.00	1.11
7	487	1.77	.00	.00	1.77
7	490	.00	.00	.00	.00
7	493	.00	.00	.00	.00
7	496	4.16	.00	.00	4.16
7	499	3.36	.00	.00	3.36
7	502	.00	.00	.00	.00
7	505	1.54	.00	.00	1.54
7	508	.58	.00	.00	.58
7	511	.00	.00	.00	.00
7	514	1.43	.00	.00	1.43
7	517	1.25	.00	.00	1.25
7	520	.00	.00	.00	.00
7	523	.00	.00	.00	.00
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		1.995	.000	.000	1.995
STANDARD ERRORS		.394	.000	.000	.394
VARIANCE		3.9	.0	.0	3.9

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME LAKE FORK SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
8	526	.00	.00	.00	.00
8	529	4.40	1.25	.00	5.65
8	532	.39	.00	.00	.39
8	535	2.34	.00	.00	2.34
8	538	.25	.00	.00	.25
8	541	.64	.00	.00	.64
8	544	16.41	.00	.00	16.41
8	547	17.41	.00	.00	17.41
8	550	6.89	.00	.00	6.89
8	553	6.54	.00	.00	6.54
8	556	14.88	.00	.00	14.88
8	559	14.65	.00	.00	14.65
8	562	11.67	.00	.00	11.67
8	565	12.61	.00	.00	12.61
8	568	15.32	.00	.00	15.32
8	571	8.80	.00	.00	8.80
8	574	.88	.00	.00	.88
8	577	33.33	.98	.00	34.31
8	580	12.95	.00	.00	12.95
8	583	9.67	.00	.00	9.67
8	586	4.06	.62	.00	4.68
8	589	5.34	.26	.00	5.60
8	592	5.40	.00	.00	5.40
8	595	35.43	.88	.00	36.31
8	598	23.72	.00	.00	23.72
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		10.559	.159	.000	10.719
STANDARD ERRORS		1.919	.072	.000	1.947
VARIANCE		92.1	.1	.0	94.8

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME COCHITI SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
9	601	8.88	.00	.00	8.88
9	604	7.77	.00	.00	7.77
9	607	9.42	.00	.00	9.42
9	610	4.55	.00	.00	4.55
9	613	2.87	.00	.00	2.87
9	616	3.03	.00	.00	3.03
9	625	5.12	.00	.00	5.12
9	628	1.92	.00	.00	1.92
9	631	17.59	.00	.00	17.59
9	634	2.59	.00	.00	2.59
9	637	18.98	.00	.00	18.98
9	640	24.41	.00	.00	24.41
9	643	15.61	.00	.00	15.61
9	646	19.96	.00	.00	19.96
9	649	10.42	.00	.00	10.42
9	652	23.62	.00	.00	23.62
9	655	12.62	.00	.00	12.62
9	658	11.49	.00	.00	11.49
9	661	17.19	.00	.00	17.19
9	664	29.51	.00	.00	29.51
9	667	11.21	.00	.00	11.21
9	670	.71	.00	.00	.71
NUMBER OF CLUSTERS		22.			
BLOCK MEANS		11.794	.000	.000	11.794
STANDARD ERRORS		1.741	.000	.000	1.741
VARIANCE		66.7	.0	.0	66.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME CAPULIN SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
10	676	11.24	.00	.00	11.24
10	679	10.46	.00	.00	10.46
10	682	6.29	.00	.00	6.29
10	694	11.70	.00	.00	11.70
10	697	5.22	.00	.00	5.22
10	700	12.36	.00	.00	12.36
10	703	12.90	.00	.00	12.90
10	706	9.65	.00	.00	9.65
10	709	12.98	.45	.00	13.43
10	712	11.18	.00	.00	11.18
10	715	8.96	.00	.00	8.96
10	718	13.17	.00	.00	13.17
10	721	7.20	.00	.00	7.20
10	724	25.03	.00	.00	25.03
10	727	16.36	.00	.00	16.36
10	730	22.78	.00	.00	22.78
10	733	9.31	.00	.00	9.31
10	736	2.69	.00	.00	2.69
10	739	1.09	.00	.00	1.09
10	742	6.99	.00	.00	6.99
10	745	24.94	.67	.00	25.60
10	748	8.49	.72	.00	9.22
NUMBER OF CLUSTERS		22.			
BLOCK MEANS		11.409	.084	.000	11.493
STANDARD ERRORS		1.347	.047	.000	1.360
VARIANCE		39.9	.0	.0	40.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME AMERICAN SPRINGS SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
11	751	23.78	.00	.00	23.78
11	754	23.63	.54	.00	24.17
11	757	17.05	.00	.00	17.05
11	760	8.31	.00	.00	8.31
11	763	12.89	.00	.00	12.89
11	766	14.08	.00	.00	14.08
11	769	16.44	.00	.00	16.44
11	772	14.47	.00	.00	14.47
11	775	5.36	.00	.00	5.36
11	778	1.43	.00	.00	1.43
11	781	2.43	.00	.00	2.43
11	784	2.61	.00	.00	2.61
11	787	19.40	.00	.00	19.40
11	790	3.77	.00	.00	3.77
11	793	15.76	.00	.00	15.76
11	796	3.49	.00	.00	3.49
11	799	8.90	.00	.00	8.90
11	802	2.24	.00	.00	2.24
11	805	8.82	.00	.00	8.82
11	808	14.47	.00	.00	14.47
11	811	6.64	.00	.00	6.64
11	814	13.56	.00	.00	13.56
11	817	13.01	.00	.00	13.01
11	820	7.66	.00	.00	7.66
11	823	8.42	.00	.00	8.42
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		10.744	.022	.000	10.766
STANDARD ERRORS		1.313	.022	.000	1.322
VARIANCE		43.1	.0	.0	43.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME LOS ALAMOS SURVEY PERIOD 1978 PRE SPRAY

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
12	826	12.78	.00	.00	12.78
12	829	1.72	.00	.00	1.72
12	832	3.02	.00	.00	3.02
12	835	1.18	.00	.00	1.18
12	838	1.06	.00	.00	1.06
12	841	3.88	.00	.00	3.88
12	844	5.17	.00	.00	5.17
12	847	14.39	.00	.00	14.39
12	850	6.82	.00	.00	6.82
12	853	5.02	.00	.00	5.02
12	856	7.78	.00	.00	7.78
12	859	5.46	.00	.00	5.46
12	862	3.62	.00	.00	3.62
12	865	4.95	.00	.00	4.95
12	868	10.85	.00	.00	10.85
12	871	11.72	.00	.00	11.72
12	874	4.07	.00	.00	4.07
12	877	12.35	.00	.00	12.35
12	880	.00	.00	.00	.00
12	883	.66	.00	.00	.66
12	886	.00	.00	.00	.00
12	889	3.45	.00	.00	3.45
12	892	6.21	.00	.00	6.21
12	895	6.35	.00	.00	6.35
12	898	5.41	.00	.00	5.41
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		5.517	.000	.000	5.517
STANDARD ERRORS		.827	.000	.000	.827
VARIANCE		17.1	.0	.0	17.1

NORMAL END OF JOB!!!!!!

$BRKPT PRINT$

B. Unanalyzed Egg Mass Density Data - 1977 & 1978

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 1

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
1	.167	.143	.0	.0	.0	.0	.0	.0
4	.124	.202	.0	.0	.0	.0	.0	.0
7	.125	.232	22.2	12.1	2.8	.0	.0	.0
10	.139	.223	1.3	.7	.2	.0	.0	.0
13	.144	.259	7.9	4.9	1.0	.0	.0	.0
16	.146	.222	5.3	3.5	.8	.0	.0	.0
19	.134	.196	6.9	2.7	.5	.0	.0	.0
22	.188	.206	1.0	.8	.2	.0	.0	.0
25	.201	.210	.0	.0	.0	.0	.0	.0
28	.169	.172	2.3	2.7	.3	.0	.0	.0
31	.176	.258	.0	.0	.0	.0	.0	.0
34	.201	.263	2.7	2.2	.5	.0	.0	.0
37	.153	.212	9.4	5.4	1.5	.0	.0	.0
40	.156	.229	6.1	3.9	1.0	.0	.0	.0
43	.142	.240	9.2	5.1	1.3	.0	.0	.0
46	.155	.308	1.2	.6	.2	.0	.0	.0
49	.167	.240	2.4	1.4	.5	.0	.0	.0
52	.156	.206	2.0	1.5	.3	.0	.0	.0
55	.168	.185	14.5	13.3	2.3	.0	.0	.0
58	.149	.198	3.0	2.3	.5	.0	.0	.0
61	.184	.229	.0	.0	.0	.0	.0	.0
64	.169	.280	.0	.0	.0	.0	.0	.0
67	.145	.320	.0	.0	.0	.0	.0	.0
70	.135	.186	2.2	1.6	.3	.0	.0	.0
73	.149	.178	5.3	3.9	.7	.0	.0	.0
CLUSTERS	25.							
MEAN	.158	.224	4.2	2.7	.6	.0	.0	.0
S.E.	.004	.008	1.1	.7	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 2

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
76	.164	.259	.0	.0	.0	.0	.0	.0
79	.181	.237	.0	.0	.0	.0	.0	.0
82	.185	.327	.0	.0	.0	.0	.0	.0
85	.162	.356	.0	.0	.0	.0	.0	.0
88	.159	.223	.0	.0	.0	.0	.0	.0
91	.134	.125	1.1	1.2	.2	.0	.0	.0
94	.142	.185	1.4	1.0	.2	.0	.0	.0
97	.143	.337	2.2	.9	.3	.0	.0	.0
100	.143	.189	.0	.0	.0	.0	.0	.0
103	.164	.161	.0	.0	.0	.0	.0	.0
106	.117	.207	2.8	1.7	.3	.0	.0	.0
109	.155	.110	1.0	1.2	.2	.0	.0	.0
112	.175	.143	2.1	2.7	.3	.0	.0	.0
115	.163	.172	.0	.0	.0	.0	.0	.0
118	.157	.259	.0	.0	.0	.0	.0	.0
121	.124	.177	8.6	6.1	1.2	.0	.0	.0
124	.177	.136	.0	.0	.0	.0	.0	.0
127	.125	.141	8.4	5.3	.8	.0	.0	.0
130	.196	.241	.0	.0	.0	.0	.0	.0
133	.163	.325	.0	.0	.0	.0	.0	.0
136	.150	.208	.0	.0	.0	.0	.0	.0
139	.129	.103	1.6	1.2	.2	.0	.0	.0
142	.201	.137	5.2	8.8	.8	.0	.0	.0
145	.163	.245	1.1	.7	.2	.0	.0	.0
148	.143	.195	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.157	.208	1.4	1.2	.2	.0	.0	.0
S.E.	.004	.015	.5	.4	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 3

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
151	.137	.192	.0	.0	.0	.0	.0	.0
154	.163	.242	.0	.0	.0	.0	.0	.0
157	.137	.125	.0	.0	.0	.0	.0	.0
160	.164	.212	.0	.0	.0	.0	.0	.0
163	.154	.195	.0	.0	.0	.0	.0	.0
166	.141	.140	.0	.0	.0	.0	.0	.0
169	.156	.107	.0	.0	.0	.0	.0	.0
172	.203	.221	.0	.0	.0	.0	.0	.0
175	.200	.132	.7	1.2	.2	.0	.0	.0
178	.146	.242	1.6	.9	.2	.0	.0	.0
181	.172	.194	.0	.0	.0	.0	.0	.0
184	.162	.211	.0	.0	.0	.0	.0	.0
187	.109	.132	.0	.0	.0	.0	.0	.0
190	.114	.164	.0	.0	.0	.0	.0	.0
193	.187	.345	.0	.0	.0	.0	.0	.0
196	.143	.267	.0	.0	.0	.0	.0	.0
199	.133	.142	.0	.0	.0	.0	.0	.0
202	.142	.165	.0	.0	.0	.0	.0	.0
205	.141	.193	.0	.0	.0	.0	.0	.0
208	.133	.282	.0	.0	.0	.0	.0	.0
211	.174	.359	.0	.0	.0	.0	.0	.0
214	.155	.139	.0	.0	.0	.0	.0	.0
217	.180	.126	.9	.8	.2	.0	.0	.0
220	.142	.203	1.3	.9	.2	.0	.0	.0
223	.176	.115	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.155	.194	.2	.2	.0	.0	.0	.0
S.E.	.005	.014	.1	.1	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 4

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
226	.163	.218	.8	.7	.2	.0	.0	.0
229	.195	.148	.0	.0	.0	.0	.0	.0
232	.160	.143	.0	.0	.0	.0	.0	.0
235	.180	.165	.8	.8	.2	.0	.0	.0
238	.168	.162	.0	.0	.0	.0	.0	.0
241	.145	.124	5.9	6.3	.8	.0	.0	.0
244	.152	.247	.8	.5	.2	.0	.0	.0
247	.161	.230	3.4	2.5	.5	.0	.0	.0
250	.166	.136	.0	.0	.0	.0	.0	.0
253	.161	.163	1.2	.9	.2	.0	.0	.0
256	.138	.152	.0	.0	.0	.0	.0	.0
259	.135	.248	.0	.0	.0	.0	.0	.0
262	.199	.290	.0	.0	.0	.0	.0	.0
265	.127	.188	4.8	2.9	.5	.0	.0	.0
268	.175	.284	1.0	.5	.2	.0	.0	.0
271	.152	.228	.0	.0	.0	.0	.0	.0
274	.166	.214	1.7	1.7	.3	.0	.0	.0
277	.136	.162	13.0	11.2	1.3	.0	.0	.0
280	.171	.308	1.9	.9	.3	.0	.0	.0
283	.167	.235	5.4	4.3	.8	.0	.0	.0
286	.145	.197	.0	.0	.0	.0	.0	.0
289	.191	.312	.0	.0	.0	.0	.0	.0
292	.128	.166	3.9	3.1	.5	.0	.0	.0
295	.165	.186	.0	.0	.0	.0	.0	.0
298	.139	.221	1.9	1.3	.2	.0	.0	.0
CLUSTERS	25.							
MEAN	.159	.205	1.9	1.5	.2	.0	.0	.0
S.E.	.004	.011	.6	.5	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 5

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
301	.152	.203	.0	.0	.0	.0	.0	.0
304	.186	.272	.0	.0	.0	.0	.0	.0
307	.164	.251	.0	.0	.0	.0	.0	.0
310	.142	.170	.0	.0	.0	.0	.0	.0
313	.126	.168	.0	.0	.0	.0	.0	.0
316	.122	.100	.0	.0	.0	.0	.0	.0
319	.184	.321	.7	.3	.2	.0	.0	.0
322	.164	.176	.0	.0	.0	.0	.0	.0
325	.154	.267	.0	.0	.0	.0	.0	.0
328	.137	.255	6.0	3.9	1.0	.0	.0	.0
331	.145	.126	4.3	4.6	.7	.0	.0	.0
334	.173	.156	.8	.9	.2	.0	.0	.0
337	.194	.190	.0	.0	.0	.0	.0	.0
340	.187	.354	.6	.4	.2	.0	.0	.0
343	.182	.134	2.8	3.8	.5	.0	.0	.0
346	.155	.268	3.3	1.7	.5	.0	.0	.0
349	.165	.124	.0	.0	.0	.0	.0	.0
352	.157	.257	1.6	1.9	.2	.0	.0	.0
355	.160	.294	.0	.0	.0	.0	.0	.0
358	.146	.227	.0	.0	.0	.0	.0	.0
361	.157	.160	6.8	6.5	1.2	.0	.0	.0
364	.125	.109	3.0	4.1	.5	.0	.0	.0
367	.159	.226	.0	.0	.0	.0	.0	.0
370	.149	.248	.0	.0	.0	.0	.0	.0
373	.151	.179	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.158	.209	1.2	1.1	.2	.0	.0	.0
S.E.	.004	.014	.4	.4	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 6

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
376	.156	.278	.0	.0	.0	.0	.0	.0
379	.159	.172	.0	.0	.0	.0	.0	.0
382	.186	.171	.9	1.1	.2	.0	.0	.0
385	.141	.081	1.1	1.2	.2	.0	.0	.0
388	.136	.140	1.4	1.9	.2	.0	.0	.0
391	.173	.254	1.9	1.2	.3	.0	.0	.0
394	.155	.272	7.6	4.4	1.2	.0	.0	.0
397	.173	.234	.0	.0	.0	.0	.0	.0
400	.171	.180	.0	.0	.0	.0	.0	.0
403	.166	.217	1.2	.7	.2	.0	.0	.0
406	.166	.196	2.0	1.5	.3	.0	.0	.0
409	.146	.264	2.1	1.2	.3	.0	.0	.0
412	.167	.210	.9	.6	.2	.0	.0	.0
415	.165	.353	1.9	1.1	.3	.0	.0	.0
418	.181	.230	1.1	.8	.2	.0	.0	.0
421	.162	.166	.0	.0	.0	.0	.0	.0
424	.138	.262	1.3	.8	.2	.0	.0	.0
427	.153	.351	.0	.0	.0	.0	.0	.0
430	.154	.252	.0	.0	.0	.0	.0	.0
433	.168	.206	1.0	.8	.2	.0	.0	.0
436	.152	.130	.0	.0	.0	.0	.0	.0
439	.138	.176	.0	.0	.0	.0	.0	.0
442	.161	.094	.0	.0	.0	.0	.0	.0
445	.178	.145	1.0	1.6	.2	.0	.0	.0
448	.138	.184	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.159	.209	1.0	.8	.2	.0	.0	.0
S.E.	.003	.014	.3	.2	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 7

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
451	.153	.172	.0	.0	.0	.0	.0	.0
454	.152	.212	4.3	3.2	.7	.0	.0	.0
457	.167	.216	.0	.0	.0	.0	.0	.0
460	.170	.184	2.1	1.3	.3	.0	.0	.0
463	.191	.211	.0	.0	.0	.0	.0	.0
466	.133	.157	.0	.0	.0	.0	.0	.0
469	.190	.247	.0	.0	.0	.0	.0	.0
472	.125	.231	2.4	1.4	.3	.0	.0	.0
475	.156	.233	5.1	3.2	.7	.0	.0	.0
478	.147	.187	3.0	2.5	.5	.0	.0	.0
481	.134	.207	.8	.5	.2	.0	.0	.0
484	.162	.155	.0	.0	.0	.0	.0	.0
487	.163	.294	4.6	2.3	.7	.0	.0	.0
490	.155	.146	.0	.0	.0	.0	.0	.0
493	.139	.246	.0	.0	.0	.0	.0	.0
496	.150	.135	.0	.0	.0	.0	.0	.0
499	.166	.141	.0	.0	.0	.0	.0	.0
502	.104	.102	.0	.0	.0	.0	.0	.0
505	.149	.132	.0	.0	.0	.0	.0	.0
506	.188	.184	1.7	1.5	.3	.0	.0	.0
511	.153	.148	.0	.0	.0	.0	.0	.0
514	.159	.183	.0	.0	.0	.0	.0	.0
517	.165	.162	.0	.0	.0	.0	.0	.0
520	.162	.176	.0	.0	.0	.0	.0	.0
523	.199	.132	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.157	.184	1.0	.6	.1	.0	.0	.0
S.E.	.004	.009	.3	.2	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 8

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
526	.134	.218	2.9	2.4	.3	.0	.0	.0
529	.153	.223	.0	.0	.0	.0	.0	.0
532	.213	.407	.0	.0	.0	.0	.0	.0
535	.159	.226	5.5	3.5	1.0	.0	.0	.0
538	.164	.157	.0	.0	.0	.0	.0	.0
541	.173	.285	.0	.0	.0	.0	.0	.0
544	.190	.187	6.0	5.1	1.0	.0	.0	.0
547	.183	.155	10.0	11.7	1.8	.0	.0	.0
550	.178	.208	4.2	3.4	.8	.0	.0	.0
553	.153	.158	26.9	26.2	4.2	.0	.0	.0
556	.167	.254	23.3	14.5	4.2	.0	.0	.0
559	.192	.179	7.9	8.4	1.5	.0	.0	.0
562	.166	.202	18.1	14.9	2.7	.0	.0	.0
565	.156	.171	2.9	2.4	.3	.0	.0	.0
568	.143	.212	22.5	16.3	3.2	.0	.0	.0
571	.156	.228	11.7	7.4	2.2	.0	.0	.0
574	.175	.182	.0	.0	.0	.0	.0	.0
577	.184	.291	13.9	7.7	2.3	.0	.0	.0
580	.159	.167	5.1	5.0	.8	.0	.0	.0
583	.200	.179	.0	.0	.0	.0	.0	.0
586	.165	.216	1.1	1.2	.2	.0	.0	.0
589	.194	.345	.0	.0	.0	.0	.0	.0
592	.156	.219	1.2	.8	.2	.0	.0	.0
595	.147	.222	4.6	3.3	.7	.0	.0	.0
598	.158	.150	18.8	19.2	3.2	.0	.0	.0
CLUSTERS	25.							
MEAN	.169	.218	7.5	6.1	1.2	.0	.0	.0
S.E.	.004	.012	1.7	1.4	.3	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 9

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
601	.128	.162	4.0	3.0	.5	.0	.0	.0
604	.150	.179	1.2	1.7	.2	.0	.0	.0
607	.136	.147	8.2	8.3	1.2	.0	.0	.0
610	.172	.440	6.1	2.4	1.0	.0	.0	.0
613	.148	.235	2.4	1.0	.3	.0	.0	.0
616	.201	.313	9.5	6.5	1.8	.0	.0	.0
619	.146	.171	.0	.0	.0	.0	.0	.0
622	.191	.160	.8	1.0	.2	.0	.0	.0
625	.198	.249	5.7	4.4	1.0	.0	.0	.0
628	.170	.212	2.9	2.7	.5	.0	.0	.0
631	.167	.226	10.7	8.0	1.7	.0	.0	.0
634	.211	.277	4.4	3.1	.8	.0	.0	.0
637	.160	.225	18.1	12.6	2.8	.0	.0	.0
640	.180	.310	5.4	3.2	.8	.0	.0	.0
643	.145	.166	5.6	3.8	.8	.0	.0	.0
646	.168	.292	15.3	10.1	2.5	.0	.0	.0
649	.145	.151	2.2	1.8	.3	.0	.0	.0
652	.159	.162	7.9	8.1	1.2	.0	.0	.0
655	.188	.270	48.6	36.6	9.0	.0	.0	.0
658	.212	.207	15.4	16.2	3.2	.0	.0	.0
661	.160	.192	43.3	34.8	6.7	.0	.0	.0
664	.174	.192	26.6	24.3	4.8	.0	.0	.0
667	.153	.230	45.5	26.2	6.0	.0	.0	.0
670	.150	.222	.0	.0	.0	.0	.0	.0
673	.181	.295	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.168	.227	11.6	8.8	1.9	.0	.0	.0
S.E.	.005	.014	2.9	2.1	.5	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 10

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
676	.162	.179	3.8	3.4	.7	.0	.0	.0
679	.177	.238	9.9	7.2	1.7	.0	.0	.0
682	.145	.216	15.9	11.9	2.3	.0	.0	.0
694	.139	.129	.0	.0	.0	.0	.0	.0
697	.162	.219	11.2	8.2	1.8	.0	.0	.0
700	.152	.130	18.1	17.1	2.5	.0	.0	.0
703	.176	.278	46.2	18.8	5.5	.0	.0	.0
706	.137	.162	26.7	22.3	3.5	.0	.0	.0
709	.132	.114	29.6	33.5	4.0	.0	.0	.0
712	.131	.157	16.3	13.5	2.2	.0	.0	.0
715	.111	.144	14.4	8.6	1.3	.0	.0	.0
718	.163	.213	9.7	7.3	1.5	.0	.0	.0
721	.130	.164	34.1	27.4	4.5	.0	.0	.0
724	.160	.226	14.9	10.8	2.3	.0	.0	.0
727	.162	.249	23.9	15.0	4.0	.0	.0	.0
730	.155	.162	10.0	9.5	1.5	.0	.0	.0
733	.148	.150	3.0	2.6	.5	.0	.0	.0
736	.152	.210	3.0	1.9	.5	.0	.0	.0
739	.118	.135	.0	.0	.0	.0	.0	.0
742	.174	.160	1.0	1.1	.2	.0	.0	.0
745	.150	.215	13.7	9.0	2.0	.0	.0	.0
748	.131	.179	11.8	8.6	1.5	.0	.0	.0
CLUSTERS	22.							
MEAN	.149	.183	14.4	10.8	2.0	.0	.0	.0
S.E.	.004	.009	2.5	1.9	.3	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 11

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
751	.204	.174	9.6	10.5	1.8	.0	.0	.0
754	.146	.097	17.0	27.0	2.8	.0	.0	.0
757	.128	.253	15.2	8.7	1.8	.0	.0	.0
760	.148	.152	14.9	12.8	1.8	.0	.0	.0
763	.138	.118	7.8	8.2	1.0	.0	.0	.0
766	.147	.147	5.9	5.4	.8	.0	.0	.0
769	.149	.306	3.1	1.4	.5	.0	.0	.0
772	.141	.156	7.9	6.8	1.0	.0	.0	.0
775	.149	.171	.7	.7	.2	.0	.0	.0
778	.128	.112	1.7	1.4	.2	.0	.0	.0
781	.115	.150	.0	.0	.0	.0	.0	.0
784	.142	.215	.0	.0	.0	.0	.0	.0
787	.149	.238	12.5	7.2	1.8	.0	.0	.0
790	.161	.147	18.3	16.3	2.8	.0	.0	.0
793	.131	.205	9.5	5.8	1.0	.0	.0	.0
796	.108	.188	9.2	4.9	1.0	.0	.0	.0
799	.141	.195	4.0	3.2	.7	.0	.0	.0
802	.153	.180	1.1	1.0	.2	.0	.0	.0
805	.144	.215	8.3	5.7	1.2	.0	.0	.0
808	.139	.158	3.7	2.7	.5	.0	.0	.0
811	.122	.112	5.6	6.8	.7	.0	.0	.0
814	.115	.127	6.1	6.2	.8	.0	.0	.0
817	.103	.106	4.8	4.9	.5	.0	.0	.0
820	.135	.204	10.7	6.8	1.3	.0	.0	.0
823	.165	.214	6.6	4.5	1.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.140	.174	7.4	6.4	1.0	.0	.0	.0
S.E.	.004	.010	1.1	1.2	.2	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 1 FOREST 10 UNIT 12

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
826	.156	.135	39.5	44.8	5.5	.0	.0	.0
829	.132	.127	1.1	1.2	.2	.0	.0	.0
832	.108	.144	1.4	1.4	.2	.0	.0	.0
835	.134	.277	9.5	4.5	1.3	.0	.0	.0
838	.164	.229	4.1	2.7	.7	.0	.0	.0
841	.141	.202	23.4	16.1	3.2	.0	.0	.0
844	.142	.173	14.9	15.1	2.2	.0	.0	.0
847	.191	.213	29.9	24.4	5.3	.0	.0	.0
850	.136	.276	27.9	14.2	3.8	.0	.0	.0
853	.184	.357	34.8	18.9	6.5	.0	.0	.0
856	.156	.265	17.9	11.7	2.8	.0	.0	.0
859	.163	.180	25.1	22.6	4.2	.0	.0	.0
862	.134	.147	19.1	18.0	2.5	.0	.0	.0
865	.166	.211	28.8	21.1	4.8	.0	.0	.0
868	.124	.161	2.4	2.0	.3	.0	.0	.0
871	.150	.278	24.8	14.2	3.7	.0	.0	.0
874	.158	.241	14.9	8.5	2.2	.0	.0	.0
877	.171	.194	40.1	34.6	6.5	.0	.0	.0
880	.167	.150	1.6	.7	.2	.0	.0	.0
883	.153	.173	.0	.0	.0	.0	.0	.0
886	.127	.211	2.5	1.3	.3	.0	.0	.0
889	.138	.332	3.2	1.2	.3	.0	.0	.0
892	.170	.188	13.8	13.8	2.3	.0	.0	.0
895	.188	.172	19.8	21.3	3.7	.0	.0	.0
898	.139	.130	35.7	42.3	4.5	.0	.0	.0
CLUSTERS	25.							
MEAN	.152	.207	17.5	14.3	2.7	.0	.0	.0
S.E.	.004	.012	2.6	2.6	.4	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 2

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
76	.201	.289	.0	.0	.0	.0	.0	.0
82	.185	.324	.0	.0	.0	.0	.0	.0
91	.162	.146	.7	1.0	.2	.0	.0	.0
94	.138	.123	.0	.0	.0	.0	.0	.0
97	.181	.286	5.7	3.9	1.0	.0	.0	.0
100	.132	.210	.0	.0	.0	.0	.0	.0
103	.122	.130	.0	.0	.0	.0	.0	.0
109	.170	.140	.0	.0	.0	.0	.0	.0
112	.137	.114	1.0	1.2	.2	.0	.0	.0
121	.146	.150	1.4	1.6	.2	.0	.0	.0
127	.163	.236	3.8	2.5	.7	.0	.0	.0
130	.180	.210	.0	.0	.0	.0	.0	.0
133	.223	.387	.0	.0	.0	.0	.0	.0
136	.164	.154	.9	.8	.2	.0	.0	.0
145	.163	.143	.0	.0	.0	.0	.0	.0
CLUSTERS	15.							
MEAN	.165	.203	.9	.7	.2	.0	.0	.0
S.E.	.007	.022	.4	.3	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 3

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
151	.141	.175	.0	.0	.0	.0	.0	.0
154	.159	.175	.9	.7	.2	.0	.0	.0
160	.170	.189	.0	.0	.0	.0	.0	.0
163	.162	.218	1.3	.7	.2	.0	.0	.0
166	.170	.148	.0	.0	.0	.0	.0	.0
169	.212	.219	.7	.4	.2	.0	.0	.0
172	.198	.241	.0	.0	.0	.0	.0	.0
181	.146	.104	.0	.0	.0	.0	.0	.0
190	.152	.176	.0	.0	.0	.0	.0	.0
193	.139	.164	.0	.0	.0	.0	.0	.0
199	.178	.229	.0	.0	.0	.0	.0	.0
208	.157	.146	.0	.0	.0	.0	.0	.0
214	.130	.142	.0	.0	.0	.0	.0	.0
217	.212	.163	.0	.0	.0	.0	.0	.0
220	.146	.182	.0	.0	.0	.0	.0	.0
CLUSTERS	15.							
MEAN	.165	.178	.2	.1	.0	.0	.0	.0
S.E.	.007	.010	.1	.1	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 4

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
226	.184	.285	.0	.0	.0	.0	.0	.0
229	.204	.283	.0	.0	.0	.0	.0	.0
235	.149	.242	.0	.0	.0	.0	.0	.0
247	.171	.269	.7	.5	.2	.0	.0	.0
250	.159	.184	1.2	1.6	.2	.0	.0	.0
253	.183	.162	1.1	1.3	.2	.0	.0	.0
256	.155	.175	.0	.0	.0	.0	.0	.0
262	.171	.259	.0	.0	.0	.0	.0	.0
265	.156	.209	6.7	4.4	.8	.0	.0	.0
268	.175	.304	1.0	.6	.2	.0	.0	.0
271	.161	.160	.0	.0	.0	.0	.0	.0
274	.170	.175	2.1	1.9	.3	.0	.0	.0
277	.171	.157	.0	.0	.0	.0	.0	.0
286	.178	.256	.8	.5	.2	.0	.0	.0
289	.136	.200	.0	.0	.0	.0	.0	.0
CLUSTERS	15.							
MEAN	.168	.221	.9	.7	.1	.0	.0	.0
S.E.	.004	.013	.4	.3	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 5

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
301	.155	.245	.0	.0	.0	.0	.0	.0
304	.180	.269	.0	.0	.0	.0	.0	.0
307	.131	.175	.0	.0	.0	.0	.0	.0
310	.177	.189	.0	.0	.0	.0	.0	.0
313	.166	.287	.0	.0	.0	.0	.0	.0
316	.181	.272	.0	.0	.0	.0	.0	.0
319	.183	.291	2.4	1.1	.3	.0	.0	.0
322	.146	.192	.0	.0	.0	.0	.0	.0
325	.183	.163	4.4	4.4	.8	.0	.0	.0
328	.176	.197	2.8	2.0	.5	.0	.0	.0
331	.170	.221	8.4	8.8	1.3	.0	.0	.0
334	.165	.218	2.4	2.2	.3	.0	.0	.0
337	.166	.212	5.3	4.3	.8	.0	.0	.0
340	.163	.232	.0	.0	.0	.0	.0	.0
343	.168	.146	.0	.0	.0	.0	.0	.0
CLUSTERS	15.							
MEAN	.167	.221	1.7	1.5	.3	.0	.0	.0
S.E.	.004	.012	.7	.7	.1	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 8

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
526	.189	.238	.0	.0	.0	.0	.0	.0
529	.171	.155	.0	.0	.0	.0	.0	.0
544	.176	.123	3.2	4.0	.5	.0	.0	.0
547	.183	.179	5.3	5.4	1.2	.0	.0	.0
550	.203	.225	3.9	3.5	.8	.0	.0	.0
553	.153	.233	14.7	9.0	2.3	.0	.0	.0
556	.152	.167	6.8	5.7	1.0	.0	.0	.0
559	.180	.219	8.1	6.9	1.3	.0	.0	.0
562	.178	.271	9.7	5.9	1.7	.0	.0	.0
565	.198	.202	10.7	10.0	2.3	.0	.0	.0
577	.184	.327	16.5	9.0	3.2	.0	.0	.0
580	.191	.202	1.7	1.7	.3	.0	.0	.0
583	.192	.196	.9	1.0	.2	.0	.0	.0
595	.185	.202	8.8	8.6	1.7	.0	.0	.0
598	.202	.259	3.8	3.6	.8	.0	.0	.0
CLUSTERS	15.							
MEAN	.183	.213	6.3	5.0	1.2	.0	.0	.0
S.E.	.004	.013	1.3	.9	.2	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 9

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
601	.172	.212	2.9	2.2	.5	.0	.0	.0
604	.180	.162	2.3	2.8	.5	.0	.0	.0
610	.158	.285	10.3	5.6	1.8	.0	.0	.0
616	.208	.247	3.3	2.6	.7	.0	.0	.0
625	.257	.345	8.0	5.7	2.3	.0	.0	.0
631	.165	.288	18.1	10.2	2.8	.0	.0	.0
634	.170	.162	.8	1.0	.2	.0	.0	.0
640	.190	.332	28.2	14.9	5.3	.0	.0	.0
643	.152	.224	12.2	8.3	1.8	.0	.0	.0
646	.166	.212	14.0	10.2	2.2	.0	.0	.0
652	.186	.381	.0	.0	.0	.0	.0	.0
658	.208	.232	7.4	6.1	1.5	.0	.0	.0
661	.227	.221	21.8	23.5	5.0	.0	.0	.0
664	.178	.182	18.0	18.3	3.2	.0	.0	.0
670	.177	.228	.9	.5	.2	.0	.0	.0
CLUSTERS	15.							
MEAN	.186	.248	9.9	7.5	1.9	.0	.0	.0
S.E.	.007	.017	2.2	1.8	.4	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 10

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
676	.168	.150	6.0	6.7	1.0	.0	.0	.0
679	.148	.188	4.2	3.4	.7	.0	.0	.0
682	.196	.164	8.4	10.7	1.7	.0	.0	.0
685	.164	.200	32.3	26.0	5.5	.0	.0	.0
688	.175	.139	13.1	18.6	2.0	.0	.0	.0
691	.195	.134	12.5	17.9	2.3	.0	.0	.0
694	.168	.177	20.4	20.0	3.5	.0	.0	.0
697	.152	.153	7.5	8.0	1.2	.0	.0	.0
700	.177	.187	21.7	20.3	3.8	.0	.0	.0
703	.191	.282	20.2	12.8	3.7	.0	.0	.0
706	.170	.123	6.5	8.4	1.0	.0	.0	.0
709	.188	.278	1.7	.9	.3	.0	.0	.0
712	.144	.199	1.2	1.1	.2	.0	.0	.0
715	.169	.147	.0	.0	.0	.0	.0	.0
718	.159	.274	22.4	12.0	3.7	.0	.0	.0
CLUSTERS	15.							
MEAN	.171	.186	11.9	11.1	2.0	.0	.0	.0
S.E.	.004	.014	2.5	2.1	.4	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1977 REGION 3 HOST 3 FOREST 10 UNIT 11

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
751	.115	.145	20.3	3.9	.5	.0	.0	.0
754	.184	.203	9.1	7.7	1.7	.0	.0	.0
757	.150	.119	19.6	27.5	3.0	.0	.0	.0
760	.141	.115	6.8	9.5	1.0	.0	.0	.0
763	.180	.167	4.8	5.0	.8	.0	.0	.0
772	.204	.145	6.6	9.7	1.5	.0	.0	.0
775	.177	.162	1.2	1.1	.2	.0	.0	.0
781	.185	.185	.0	.0	.0	.0	.0	.0
784	.161	.209	.0	.0	.0	.0	.0	.0
793	.156	.174	7.2	6.2	1.0	.0	.0	.0
802	.152	.217	9.9	6.8	1.5	.0	.0	.0
805	.165	.092	3.9	7.6	.7	.0	.0	.0
814	.161	.169	2.1	1.9	.3	.0	.0	.0
817	.162	.123	1.8	2.2	.2	.0	.0	.0
820	.159	.197	6.2	5.4	1.0	.0	.0	.0
CLUSTERS	15.							
MEAN	.164	.162	6.6	6.3	.9	.0	.0	.0
S.E.	.005	.010	1.6	1.7	.2	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 1

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
1	.152	.399	3.0	3.7	.3	.0	.3	1.5
4	.150	.210	.0	.0	.0	.0	.0	.3
7	.173	.247	6.3	3.7	1.3	1.3	.0	1.0
10	.100	.172	1.6	1.0	.2	.2	.0	.0
13	.151	.214	1.0	.4	.2	.2	.0	.3
16	.219	.355	.8	.5	.2	.2	.0	.0
19	.166	.219	.0	.0	.0	.0	.0	.0
22	.125	.206	1.7	.9	.2	.2	.0	.0
25	.145	.133	.0	.0	.0	.0	.0	.0
28	.153	.221	.8	.6	.2	.2	.0	.0
31	.151	.210	.0	.0	.0	.0	.0	.0
34	.159	.183	.0	.0	.0	.0	.0	.0
37	.212	.332	.7	.3	.2	.0	.2	2.0
40	.160	.272	.0	.0	.0	.0	.0	.0
43	.173	.288	.0	.0	.0	.0	.0	.2
46	.174	.282	.0	.0	.0	.0	.0	.0
49	.109	.207	1.3	.7	.2	.0	.0	.0
52	.172	.282	.0	.0	.0	.0	.0	.2
55	.120	.209	.0	.0	.0	.0	.0	.2
58	.098	.165	3.3	1.9	.3	.3	.0	.0
61	.186	.235	.0	.0	.0	.0	.0	.2
64	.152	.251	.0	.0	.0	.0	.0	1.0
67	.143	.307	.0	.0	.0	.0	.0	.2
70	.107	.175	1.6	1.0	.2	.2	.0	.0
73	.183	.236	.8	1.0	.2	.2	.0	.2
CLUSTERS	25.							
MEAN	.153	.240	.9	.6	.1	.1	.0	.3
S.E.	.006	.013	.3	.2	.1	.1	.0	.1

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 2

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
76	.126	.174	.0	.0	.0	.0	.0	.0
79	.178	.203	.0	.0	.0	.0	.0	.0
82	.188	.237	.0	.0	.0	.0	.0	.0
85	.196	.277	.0	.0	.0	.0	.0	.0
88	.149	.240	.0	.0	.0	.0	.0	.0
91	.176	.216	.0	.0	.0	.0	.0	.3
94	.165	.181	.0	.0	.0	.0	.0	.0
97	.113	.197	.0	.0	.0	.0	.0	.0
100	.124	.196	.0	.0	.0	.0	.0	.0
103	.110	.115	.0	.0	.0	.0	.0	.0
106	.152	.209	.0	.0	.0	.0	.0	.0
109	.185	.196	.0	.0	.0	.0	.0	.3
112	.156	.176	.0	.0	.0	.0	.0	.0
115	.215	.214	.0	.0	.0	.0	.0	.0
118	.182	.224	.0	.0	.0	.0	.0	.0
121	.221	.329	.0	.0	.0	.0	.0	.0
124	.172	.205	.0	.0	.0	.0	.0	.2
127	.163	.187	.0	.0	.0	.0	.0	.0
130	.171	.246	.0	.0	.0	.0	.0	.0
133	.162	.268	.0	.0	.0	.0	.0	.0
136	.166	.206	.0	.0	.0	.0	.0	.0
139	.192	.169	.0	.0	.0	.0	.0	.0
142	.187	.165	.0	.0	.0	.0	.0	.0
145	.156	.204	.0	.0	.0	.0	.0	.2
148	.107	.188	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.164	.209	.0	.0	.0	.0	.0	.0
S.E.	.006	.008	.0	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 3

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
151	.128	.186	.0	.0	.0	.0	.0	.0
154	.152	.364	.0	.0	.0	.0	.0	.2
157	.194	.172	.0	.0	.0	.0	.0	.0
160	.174	.188	.0	.0	.0	.0	.0	.2
163	.184	.136	1.8	1.9	.3	.3	.0	.3
166	.162	.135	.0	.0	.0	.0	.0	.0
169	.190	.176	1.3	1.0	.2	.2	.0	.0
172	.206	.148	.0	.0	.0	.0	.0	.0
175	.167	.155	.0	.0	.0	.0	.0	.0
178	.186	.223	.0	.0	.0	.0	.0	.0
181	.189	.207	.9	.6	.2	.2	.0	.0
184	.165	.302	.9	.8	.2	.2	.0	.0
187	.137	.114	1.1	2.2	.2	.2	.0	.0
190	.139	.118	.0	.0	.0	.0	.0	.0
193	.204	.256	.0	.0	.0	.0	.0	.0
196	.185	.206	.0	.0	.0	.0	.0	.0
199	.133	.153	.0	.0	.0	.0	.0	.0
202	.150	.128	.0	.0	.0	.0	.0	.0
205	.155	.141	.0	.0	.0	.0	.0	.0
208	.167	.150	.0	.0	.0	.0	.0	.0
211	.234	.272	.0	.0	.0	.0	.0	.0
214	.165	.194	.0	.0	.0	.0	.0	.0
217	.174	.116	.0	.0	.0	.0	.0	.0
220	.157	.216	.0	.0	.0	.0	.0	.0
223	.186	.170	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.171	.185	.2	.3	.0	.0	.0	.0
S.E.	.005	.012	.1	.1	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 4

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
226	.169	.243	.0	.0	.0	.0	.0	.0
229	.132	.203	2.6	1.2	.3	.3	.0	.0
232	.167	.212	.9	.6	.2	.2	.0	.0
235	.143	.175	.0	.0	.0	.0	.0	.0
238	.122	.645	.0	.0	.0	.0	.0	.0
241	.150	.142	.0	.0	.0	.0	.0	.0
244	.122	.160	.0	.0	.0	.0	.0	.0
247	.155	.221	.0	.0	.0	.0	.0	.0
250	.142	.171	.0	.0	.0	.0	.0	.0
253	.137	.251	2.6	1.6	.3	.2	.2	.2
256	.100	.167	.0	.0	.0	.0	.0	.0
259	.131	.180	.0	.0	.0	.0	.0	.0
262	.192	.319	.0	.0	.0	.0	.0	.3
265	.136	.243	1.1	.7	.2	.2	.0	.2
277	.131	.293	3.4	1.9	.3	.3	.0	.3
280	.177	.208	1.4	1.2	.2	.2	.0	.0
283	.164	.185	.0	.0	.0	.0	.0	.2
286	.164	.267	.0	.0	.0	.0	.0	.2
289	.160	.161	.0	.0	.0	.0	.0	.2
292	.155	.199	.7	.6	.2	.2	.0	.0
295	.174	.243	.0	.0	.0	.0	.0	.0
298	.154	.165	1.2	.8	.2	.2	.0	.7
CLUSTERS	22.							
MEAN	.149	.230	.6	.4	.1	.1	.0	.1
S.E.	.005	.022	.2	.1	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 5

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
301	.174	.199	.0	.0	.0	.0	.0	.0
304	.191	.249	.0	.0	.0	.0	.0	.0
307	.164	.308	.0	.0	.0	.0	.0	.0
310	.128	.131	.0	.0	.0	.0	.0	.0
313	.139	.109	.0	.0	.0	.0	.0	.0
316	.118	.140	.0	.0	.0	.0	.0	.3
319	.145	.202	.0	.0	.0	.0	.0	.3
322	.166	.185	.0	.0	.0	.0	.0	.0
325	.185	.237	.0	.0	.0	.0	.0	.0
328	.170	.287	.0	.0	.0	.0	.0	.3
331	.177	.237	.0	.0	.0	.0	.0	.0
337	.164	.267	2.1	1.2	.3	.2	.2	.5
340	.191	.287	3.9	3.4	.8	.8	.0	.3
343	.155	.262	.0	.0	.0	.0	.0	.2
346	.169	.228	1.1	.7	.2	.2	.0	.7
349	.167	.213	.0	.0	.0	.0	.0	.2
352	.153	.205	.0	.0	.0	.0	.0	.3
355	.160	.260	.0	.0	.0	.0	.0	.0
358	.148	.192	.0	.0	.0	.0	.0	.5
361	.135	.241	2.3	1.4	.3	.3	.0	.3
364	.152	.189	.0	.0	.0	.0	.0	.3
367	.157	.217	.0	.0	.0	.0	.0	11.7
370	.182	.206	.0	.0	.0	.0	.0	.0
373	.148	.160	.0	.0	.0	.0	.0	.0
CLUSTERS	24.							
MEAN	.160	.217	.4	.3	.1	.1	.0	.7
S.E.	.004	.010	.2	.2	.0	.0	.0	.5

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 6

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
376	.138	.194	1.8	1.1	.2	.2	.0	.0
379	.114	.182	.0	.0	.0	.0	.0	.0
382	.170	.194	1.1	1.2	.2	.2	.0	.0
385	.150	.206	.0	.0	.0	.0	.0	.0
388	.200	.245	1.0	.6	.2	.2	.0	.2
391	.211	.274	.6	.4	.2	.2	.0	.7
394	.185	.158	.0	.0	.0	.0	.0	.0
397	.168	.281	.0	.0	.0	.0	.0	.0
400	.191	.123	.0	.0	.0	.0	.0	.0
403	.192	.155	.0	.0	.0	.0	.0	.3
406	.160	.254	.8	.5	.2	.2	.0	.3
409	.178	.229	.0	.0	.0	.0	.0	.0
412	.141	.165	1.3	.9	.2	.2	.0	.2
415	.226	.255	.0	.0	.0	.0	.0	.3
418	.192	.305	.0	.0	.0	.0	.0	.2
421	.185	.209	.0	.0	.0	.0	.0	.0
424	.157	.177	.0	.0	.0	.0	.0	.0
427	.197	.273	.0	.0	.0	.0	.0	.2
430	.159	.183	3.7	4.3	.5	.3	.2	1.3
433	.157	.375	.0	.0	.0	.0	.0	.0
436	.176	.258	.8	.4	.2	.2	.0	.3
439	.194	.160	.0	.0	.0	.0	.0	.0
442	.097	.113	1.4	1.2	.2	.2	.0	.0
445	.166	.238	.0	.0	.0	.0	.0	.0
448	.121	.207	.0	.0	.0	.0	.0	.0
CLUSTERS	25.							
MEAN	.169	.217	.5	.4	.1	.1	.0	.2
S.E.	.006	.012	.2	.2	.0	.0	.0	.1

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 7

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
451	.206	.231	.0	.0	.0	.0	.0	.0
454	.157	.154	1.0	1.0	.2	.2	.0	.3
457	.117	.215	1.2	.8	.2	.2	.0	.2
460	.160	.271	2.2	1.3	.3	.3	.0	.7
463	.184	.297	2.6	1.6	.5	.5	.0	.3
466	.161	.227	.0	.0	.0	.0	.0	.3
469	.181	.232	1.8	1.2	.3	.3	.0	.7
472	.158	.185	2.4	2.0	.3	.3	.0	.2
475	.127	.222	.0	.0	.0	.0	.0	.2
478	.143	.177	1.4	.9	.2	.2	.0	.3
481	.166	.275	1.3	.9	.2	.2	.0	.2
484	.153	.143	.0	.0	.0	.0	.0	.0
487	.163	.255	.0	.0	.0	.0	.0	.0
490	.142	.197	.0	.0	.0	.0	.0	.0
493	.153	.202	1.3	1.0	.2	.2	.0	.0
496	.157	.170	6.3	5.5	1.0	1.0	.0	2.2
499	.166	.211	.0	.0	.0	.0	.0	.5
502	.161	.276	.0	.0	.0	.0	.0	.0
505	.181	.260	1.0	.7	.2	.0	.2	.7
508	.161	.273	2.3	1.3	.3	.3	.0	.2
511	.161	.177	.0	.0	.0	.0	.0	.2
514	.172	.232	.0	.0	.0	.0	.0	.2
517	.142	.122	.0	.0	.0	.0	.0	.0
520	.209	.205	.0	.0	.0	.0	.0	.0
523	.172	.125	1.0	1.3	.2	.0	.2	.5
CLUSTERS	25.							
MEAN	.162	.213	1.0	.8	.2	.1	.0	.3
S.E.	.004	.010	.3	.2	.0	.0	.0	.1

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 8

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
526	.129	.133	.0	.0	.0	.0	.0	.0
529	.148	.117	1.4	1.1	.2	.2	.0	.3
532	.159	.552	.0	.0	.0	.0	.0	.0
535	.146	.233	1.1	1.7	.2	.2	.0	.0
538	.152	.164	.9	.7	.2	.2	.0	.2
541	.125	.165	.0	.0	.0	.0	.0	.0
544	.122	.147	1.3	.9	.2	.2	.0	.2
547	.156	.134	3.6	3.3	.5	.5	.0	.0
550	.169	.147	1.5	1.6	.3	.3	.0	.2
553	.166	.186	7.5	7.1	1.3	1.2	.2	1.8
556	.180	.252	38.5	24.4	7.0	7.0	.0	2.3
559	.210	.232	18.3	17.7	3.8	3.8	.0	2.8
562	.149	.217	35.0	26.5	4.8	4.8	.0	2.5
565	.120	.156	24.3	19.3	2.8	2.7	.2	2.5
568	.159	.225	19.8	16.2	3.2	3.2	.0	4.2
571	.120	.251	36.7	17.8	4.3	4.3	.0	2.8
574	.198	.208	.0	.0	.0	.0	.0	.3
577	.139	.177	31.2	25.3	4.7	4.7	.0	8.8
580	.154	.217	.0	.0	.0	.0	.0	.0
583	.139	.179	5.0	3.1	.8	.7	.2	1.3
586	.096	.149	8.8	5.3	.8	.8	.0	.2
589	.185	.290	5.6	3.7	1.0	1.0	.0	2.5
592	.163	.151	.8	1.7	.2	.2	.0	.2
595	.124	.101	21.2	26.6	2.7	2.7	.0	3.5
598	.166	.273	17.6	10.3	3.2	3.2	.0	11.5
CLUSTERS	25.							
MEAN	.151	.202	11.2	8.6	1.7	1.7	.0	1.9
S.E.	.005	.018	2.6	2.0	.4	.4	.0	.6

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 9

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
601	.163	.170	.0	.0	.0	.0	.0	.0
604	.187	.331	3.9	2.5	.7	.7	.0	.2
607	.151	.207	17.7	10.0	2.7	2.5	.2	1.8
610	.158	.178	11.3	10.5	1.7	1.7	.0	.7
613	.174	.285	2.8	1.7	.5	.5	.0	.7
616	.187	.203	6.0	5.1	1.0	1.0	.0	.5
625	.124	.136	8.5	5.4	1.0	1.0	.0	.5
628	.143	.194	6.4	5.9	.8	.8	.0	.2
631	.107	.208	30.9	16.5	3.3	3.3	.0	.5
634	.139	.192	.0	.0	.0	.0	.0	.0
637	.182	.255	2.9	2.2	.5	.5	.0	.3
640	.103	.164	19.1	14.1	1.8	1.8	.0	1.7
643	.145	.219	12.9	8.3	1.8	1.7	.2	3.2
646	.111	.159	12.7	8.7	1.5	1.5	.0	1.0
649	.168	.221	5.6	4.2	1.0	1.0	.0	.8
652	.171	.205	5.7	5.1	1.0	1.0	.0	2.2
655	.181	.143	10.0	15.3	2.0	1.7	.3	4.5
658	.135	.140	32.3	31.0	3.7	3.7	.0	4.3
661	.127	.150	32.6	25.1	4.0	4.0	.0	6.3
664	.160	.173	35.2	33.1	5.8	5.8	.0	1.8
670	.131	.145	3.8	3.1	.7	.7	.0	.2
CLUSTERS	21.							
MEAN	.150	.194	12.4	9.9	1.7	1.7	.0	1.5
S.E.	.006	.011	2.5	2.1	.3	.3	.0	.4

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 10

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
676	.136	.189	3.5	2.4	.5	.5	.0	.2
679	.155	.226	7.8	7.4	1.0	1.0	.0	1.2
682	.147	.169	5.6	5.8	.8	.8	.0	4.2
694	.185	.164	2.9	3.0	.5	.5	.0	.3
697	.176	.161	6.8	6.5	1.2	1.2	.0	.0
700	.158	.227	27.8	21.2	4.5	4.3	.2	3.0
703	.169	.115	13.4	15.7	2.5	2.2	.3	3.3
706	.139	.188	9.2	6.7	1.3	1.3	.0	4.3
709	.171	.164	15.6	14.4	2.8	2.7	.2	3.0
712	.173	.210	20.5	16.6	3.5	3.5	.0	1.8
715	.172	.167	17.7	15.5	3.0	3.0	.0	1.5
718	.168	.181	16.9	15.6	2.7	2.5	.2	1.3
721	.142	.136	9.6	7.3	1.0	1.0	.0	1.5
724	.163	.234	34.3	22.7	5.7	5.7	.0	4.7
727	.156	.181	21.5	17.1	3.0	3.0	.0	.7
730	.152	.125	17.7	20.3	2.3	2.3	.0	.7
733	.166	.194	17.2	14.2	2.7	2.3	.3	.3
736	.143	.217	7.5	7.7	1.0	1.0	.0	.3
739	.150	.171	.0	.0	.0	.0	.0	.0
742	.156	.221	.0	.0	.0	.0	.0	.0
745	.159	.136	12.8	16.4	2.3	2.3	.0	3.0
748	.129	.204	6.4	4.2	.7	.7	.0	.8
CLUSTERS	22.							
MEAN	.158	.181	12.5	10.9	2.0	1.9	.1	1.6
S.E.	.003	.007	1.9	1.5	.3	.3	.0	.3

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 11

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
751	.162	.173	12.6	11.4	1.7	1.5	.2	1.5
754	.094	.110	26.0	22.9	2.5	2.5	.0	1.8
757	.149	.179	20.5	16.8	3.2	2.8	.3	2.0
760	.161	.192	8.8	7.0	1.3	1.3	.0	2.2
763	.136	.100	19.3	28.6	2.7	2.5	.2	1.3
766	.110	.134	13.8	11.5	1.5	1.5	.0	3.3
769	.150	.204	12.9	9.2	2.0	2.0	.0	.8
772	.167	.190	3.0	2.4	.5	.5	.0	1.2
775	.134	.132	.0	.0	.0	.0	.0	.0
778	.166	.181	.8	1.0	.2	.2	.0	.0
781	.145	.201	.9	.6	.2	.2	.0	.5
784	.122	.195	3.2	1.6	.5	.3	.2	.0
787	.150	.136	11.7	11.6	1.7	1.5	.2	1.2
790	.115	.139	21.8	19.3	2.5	2.3	.2	2.3
793	.136	.174	11.3	9.4	1.5	1.5	.0	1.0
796	.167	.157	2.2	2.0	.5	.5	.0	.3
799	.148	.250	9.5	5.6	1.3	1.3	.0	.3
802	.166	.189	6.1	4.9	1.0	.8	.2	.7
805	.126	.211	15.5	9.4	1.8	1.7	.2	.3
808	.150	.268	15.7	8.6	2.3	2.3	.0	.7
811	.161	.202	4.2	3.0	.7	.7	.0	.0
814	.152	.157	27.3	27.7	4.0	4.0	.0	.8
817	.108	.140	22.3	18.5	2.0	1.5	.5	1.0
820	.145	.171	5.7	4.9	.8	.8	.0	1.7
823	.424	.237	2.3	8.1	.5	.5	.0	.0
CLUSTERS	25.							
MEAN	.154	.177	11.1	9.8	1.5	1.4	.1	1.0
S.E.	.012	.008	1.7	1.7	.2	.2	.0	.2

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 1 FOREST 10 UNIT 12

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
826	.149	.162	18.4	18.2	2.7	2.7	.0	3.0
829	.149	.167	.0	.0	.0	.0	.0	.5
832	.142	.124	.0	.0	.0	.0	.0	.0
835	.185	.266	3.2	2.1	.5	.5	.0	1.0
838	.129	.200	2.4	1.8	.3	.3	.0	.0
841	.153	.199	6.8	5.2	1.2	1.2	.0	3.7
844	.190	.164	13.7	17.1	2.5	2.3	.2	1.8
847	.184	.154	15.2	21.4	2.8	2.7	.2	4.0
850	.136	.170	8.5	6.5	1.2	1.2	.0	1.8
853	.083	.131	14.2	8.5	1.0	1.0	.0	1.8
856	.132	.221	33.4	16.6	4.8	4.3	.5	7.8
859	.157	.215	18.1	13.6	2.8	2.8	.0	4.2
862	.128	.167	19.4	13.8	2.2	2.2	.0	1.7
865	.162	.219	25.9	17.4	3.5	3.5	.0	2.3
868	.126	.169	8.2	6.1	1.0	1.0	.0	.8
871	.121	.152	29.9	24.2	3.2	3.2	.0	2.2
874	.161	.222	14.4	13.0	2.3	2.2	.2	4.8
877	.126	.184	18.9	14.0	2.2	2.0	.2	5.8
880	.173	.195	.8	.6	.2	.2	.0	.3
883	.163	.224	2.3	2.0	.3	.3	.0	.3
886	.184	.280	10.8	8.1	2.0	1.7	.3	4.0
889	.117	.252	2.4	1.3	.3	.2	.2	.0
892	.170	.290	25.8	18.2	4.3	4.3	.0	4.2
895	.151	.171	4.6	3.5	.7	.7	.0	.5
898	.142	.167	14.2	14.4	2.2	2.2	.0	3.0
CLUSTERS	25.							
MEAN	.149	.195	12.5	9.9	1.8	1.7	.1	2.4
S.E.	.005	.009	1.9	1.5	.3	.3	.0	.4

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 2

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
76	.198	.252	.8	.6	.2	.2	.0	.0
82	.184	.208	.0	.0	.0	.0	.0	.0
91	.173	.172	.0	.0	.0	.0	.0	.2
94	.185	.148	1.0	1.3	.2	.2	.0	.0
97	.142	.295	1.2	.5	.2	.2	.0	.2
100	.182	.256	.0	.0	.0	.0	.0	.0
103	.198	.241	.0	.0	.0	.0	.0	.0
109	.171	.152	.0	.0	.0	.0	.0	.2
112	.237	.233	.0	.0	.0	.0	.0	.2
121	.181	.301	.7	.7	.2	.2	.0	.0
127	.197	.296	.0	.0	.0	.0	.0	.3
130	.196	.183	.0	.0	.0	.0	.0	.0
133	.135	.202	.0	.0	.0	.0	.0	.0
136	.171	.144	.0	.0	.0	.0	.0	.0
145	.180	.167	.0	.0	.0	.0	.0	.0
CLUSTERS	15.							
MEAN	.182	.217	.2	.2	.0	.0	.0	.1
S.E.	.006	.014	.1	.1	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 3

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
151	.176	.192	.8	.7	.2	.2	.0	.2
154	.201	.262	1.0	.7	.2	.2	.0	.2
160	.166	.198	.0	.0	.0	.0	.0	.0
163	.163	.193	.0	.0	.0	.0	.0	.0
166	.194	.213	.0	.0	.0	.0	.0	.0
169	.190	.172	.9	.8	.2	.2	.0	.0
172	.193	.252	.0	.0	.0	.0	.0	.0
181	.167	.120	.0	.0	.0	.0	.0	.0
190	.184	.212	.0	.0	.0	.0	.0	.2
193	.139	.151	2.3	2.4	.3	.3	.0	.2
199	.133	.231	1.0	.6	.2	.2	.0	.0
208	.143	.178	.0	.0	.0	.0	.0	.0
214	.187	.186	.7	.7	.2	.2	.0	.0
217	.169	.242	1.2	1.0	.2	.2	.0	.0
220	.148	.150	.0	.0	.0	.0	.0	.2
CLUSTERS	15.							
MEAN	.170	.197	.5	.5	.1	.1	.0	.1
S.E.	.006	.010	.2	.2	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 4

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
226	.154	.154	.0	.0	.0	.0	.0	.0
229	.191	.171	.0	.0	.0	.0	.0	.0
235	.142	.160	.0	.0	.0	.0	.0	.0
247	.173	.301	.0	.0	.0	.0	.0	.0
250	.101	.139	.0	.0	.0	.0	.0	.0
253	.196	.270	6.8	5.0	1.3	1.3	.0	.5
256	.148	.109	.0	.0	.0	.0	.0	.0
262	.171	.265	.0	.0	.0	.0	.0	.0
265	.205	.283	1.1	.6	.2	.2	.0	.3
277	.138	.133	.0	.0	.0	.0	.0	.3
286	.182	.186	1.1	1.2	.2	.2	.0	.2
289	.164	.279	.0	.0	.0	.0	.0	.0
CLUSTERS	12.							
MEAN	.164	.204	.8	.6	.1	.1	.0	.1
S.E.	.008	.020	.6	.4	.1	.1	.0	.1

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 5

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
301	.199	.245	.0	.0	.0	.0	.0	.0
304	.189	.264	.0	.0	.0	.0	.0	.0
313	.172	.172	.0	.0	.0	.0	.0	.0
316	.184	.297	2.0	1.4	.5	.5	.0	.8
322	.223	.296	.0	.0	.0	.0	.0	.0
325	.237	.257	.0	.0	.0	.0	.0	.0
328	.194	.371	.0	.0	.0	.0	.0	.2
343	.155	.210	.0	.0	.0	.0	.0	.0
349	.206	.285	.0	.0	.0	.0	.0	.2
352	.216	.520	.0	.0	.0	.0	.0	11.7
355	.164	.172	1.0	.7	.2	.2	.0	.2
361	.186	.257	5.0	4.8	1.0	1.0	.0	.8
367	.192	.277	.0	.0	.0	.0	.0	.0
373	.169	.197	.0	.0	.0	.0	.0	.0
CLUSTERS	14.							
MEAN	.192	.273	.6	.5	.1	.1	.0	1.0
S.E.	.006	.024	.4	.3	.1	.1	.0	.8

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 8

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
526	.187	.176	.0	.0	.0	.0	.0	.0
529	.188	.155	.0	.0	.0	.0	.0	.0
544	.170	.112	3.5	6.2	.7	.7	.0	.7
547	.148	.149	16.7	15.9	2.7	2.5	.2	1.3
550	.220	.208	1.9	1.9	.5	.5	.0	.3
553	.173	.175	20.3	21.6	3.5	3.2	.3	1.3
556	.153	.159	18.5	18.2	2.8	2.8	.0	2.7
559	.170	.189	19.3	16.5	3.2	2.8	.3	4.2
562	.198	.205	12.1	12.2	2.5	2.5	.0	1.2
565	.183	.208	14.7	14.3	2.7	2.5	.2	2.8
577	.195	.238	66.2	54.5	13.0	12.8	.2	14.2
580	.188	.196	17.4	18.0	3.2	3.0	.2	4.5
583	.171	.168	4.1	4.2	.7	.3	.3	.0
595	.127	.155	35.1	25.1	4.2	4.2	.0	1.3
598	.163	.139	44.3	60.1	7.3	7.0	.3	5.0
CLUSTERS	15.							
MEAN	.176	.176	18.3	17.9	3.1	3.0	.1	2.6
S.E.	.006	.008	4.7	4.6	.9	.8	.0	.9

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 9

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
601	.138	.152	1.2	1.0	.2	.2	.0	.0
604	.172	.302	4.1	2.5	.7	.3	.0	.7
610	.176	.282	15.5	10.1	2.3	2.3	.0	1.8
616	.191	.250	.0	.0	.0	.0	.0	.7
625	.192	.204	12.4	10.8	2.0	2.0	.0	.7
631	.184	.272	18.3	11.8	3.3	3.3	.0	1.2
634	.187	.167	7.3	8.5	1.3	1.3	.0	1.8
640	.157	.175	8.8	8.6	1.3	1.3	.0	.8
643	.194	.317	9.0	5.5	1.8	1.8	.0	.2
646	.195	.185	21.8	22.4	3.8	3.8	.0	.8
652	.149	.148	4.2	5.2	.7	.7	.0	1.5
658	.176	.200	34.3	32.9	5.8	5.7	.2	4.3
661	.179	.134	35.1	37.8	5.8	5.3	.2	2.5
664	.188	.264	54.0	36.6	11.7	11.3	.3	5.7
670	.187	.208	2.8	2.1	.5	.2	.3	.3
CLUSTERS	15.							
MEAN	.178	.217	15.2	13.1	2.8	2.6	.1	1.5
S.E.	.004	.015	4.0	3.4	.8	.8	.0	.4

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 10

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
676	.183	.082	5.7	14.8	1.0	1.0	.0	.7
697	.177	.181	10.9	9.8	1.8	1.5	.3	.3
700	.176	.252	32.4	23.1	5.7	5.2	.5	1.8
706	.197	.215	34.3	32.4	7.2	6.5	.0	3.3
709	.170	.195	18.1	11.8	2.7	2.7	.0	3.0
712	.183	.188	21.3	21.2	3.8	3.7	.2	1.2
715	.175	.233	49.7	40.9	8.2	7.7	.5	3.3
721	.172	.202	14.9	14.2	2.5	2.3	.2	.8
724	.190	.207	28.7	25.6	5.3	5.2	.2	4.2
727	.195	.217	6.8	6.4	1.3	1.3	.0	.7
730	.162	.199	8.4	5.4	1.3	1.3	.0	1.0
733	.174	.264	5.2	2.8	.8	.8	.0	.7
736	.202	.260	7.0	5.6	1.5	1.5	.0	.0
739	.134	.135	1.1	.7	.2	.2	.0	.0
745	.168	.222	27.6	19.6	4.7	4.7	.0	1.8
CLUSTERS	15.							
MEAN	.177	.204	18.1	15.6	3.2	3.0	.1	1.5
S.E.	.004	.012	3.6	3.0	.6	.6	.0	.3

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1978 REGION 3 HOST 3 FOREST 10 UNIT 11

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD
751	.129	.182	7.6	5.3	1.2	1.0	.2	.5
757	.170	.125	13.3	18.9	2.3	2.3	.0	1.7
760	.180	.160	24.3	26.1	4.7	4.2	.5	2.8
763	.156	.127	19.9	20.9	3.3	3.3	.0	1.5
766	.185	.175	18.4	19.1	3.3	3.3	.0	2.7
772	.192	.221	19.5	17.3	3.7	3.7	.0	7.5
775	.143	.107	6.7	7.6	.8	.8	.0	1.5
781	.190	.155	1.0	1.6	.2	.2	.0	.0
784	.167	.153	.9	1.0	.2	.2	.0	.8
793	.171	.194	43.3	33.4	7.8	7.7	.2	2.5
802	.179	.176	12.5	13.5	2.2	2.0	.2	.7
805	.177	.161	10.1	10.5	1.7	1.7	.0	1.0
814	.127	.129	9.3	9.5	1.2	1.2	.0	.8
817	.128	.129	23.1	23.2	2.8	2.7	.2	1.7
820	.173	.186	24.9	23.6	4.5	4.5	.0	.3
CLUSTERS	15.							
MEAN	.164	.159	15.6	15.4	2.7	2.6	.1	1.7
S.E.	.006	.008	2.8	2.4	.5	.5	.0	.5

NORMAL END OF JOB

*BRKPT PRINT$

C. Unanalyzed Defoliation Data - 1977 & 1978

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME SAN MIGUEL HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
1	1	66.2	53.7	53.0
1	7	71.1	58.6	58.2
1	10	61.4	48.9	47.5
1	13	66.6	54.1	54.3
1	22	41.4	28.9	24.1
1	25	30.9	18.4	8.4
1	28	55.4	42.9	39.8
1	34	44.7	32.2	29.0
1	37	62.5	50.0	50.5
1	49	60.7	48.2	48.7
1	52	75.6	63.1	65.0
1	58	79.3	66.8	69.0
1	61	31.8	19.3	10.1
1	64	28.7	16.2	5.7
1	70	72.3	59.8	60.9
NUMBER OF CLUSTERS	15.			
MEAN		56.6	44.1	41.6
STANDARD ERROR		4.4	4.4	5.5
VARIANCE		287.8	287.8	446.8

UNIT NAME JOAQUIN HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
2	76	26.1	13.6	2.0
2	82	25.4	12.9	.8
2	91	49.7	37.2	33.7
2	94	40.8	28.3	21.8
2	97	37.0	24.5	19.6
2	100	28.1	15.6	5.7
2	103	27.1	14.6	4.8
2	109	37.1	24.6	16.5
2	112	57.1	44.6	41.6
2	121	52.5	40.0	37.7
2	127	74.6	62.1	65.5
2	130	31.4	18.9	12.5
2	133	26.7	14.2	2.5
2	136	28.1	15.6	6.5
2	145	45.1	32.6	26.6
NUMBER OF CLUSTERS	15.			
MEAN		39.1	26.6	19.9
STANDARD ERROR		3.7	3.7	4.8
VARIANCE		205.6	205.6	340.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME SMOKEY BEAR HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
3	151	29.7	17.2	9.2
3	154	31.3	18.8	12.8
3	160	40.5	28.0	22.0
3	163	33.8	21.3	12.6
3	166	28.0	15.5	6.2
3	169	33.9	21.4	14.8
3	172	34.1	21.6	13.0
3	181	47.1	34.6	32.5
3	190	32.2	19.7	10.1
3	193	38.2	25.7	20.9
3	199	42.2	29.7	27.5
3	208	28.2	15.7	5.0
3	214	45.1	32.6	27.4
3	217	32.0	19.5	12.1
3	220	53.8	41.3	39.2
NUMBER OF CLUSTERS	15.			
MEAN		36.7	24.2	17.7
STANDARD ERROR		2.0	2.0	2.6
VARIANCE		57.9	57.9	102.4

UNIT NAME TRAIL HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
4	226	34.8	22.3	13.6
4	229	47.6	35.1	31.5
4	235	32.7	20.2	12.0
4	247	54.2	41.7	39.5
4	250	33.2	20.7	11.4
4	253	59.1	46.6	44.9
4	256	36.8	24.3	16.3
4	262	55.0	42.5	39.7
4	265	92.4	79.9	85.5
4	268	55.0	42.5	40.7
4	271	36.2	23.7	16.5
4	274	51.4	38.9	35.1
4	277	90.7	78.2	82.4
4	286	61.1	48.6	48.9
4	289	52.2	39.7	37.5
NUMBER OF CLUSTERS	15.			
MEAN		52.8	40.3	37.0
STANDARD ERROR		4.8	4.8	5.9
VARIANCE		343.2	343.2	525.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME BLUE BIRD HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
5	301	27.2	14.7	3.6
5	304	31.9	19.4	10.5
5	313	26.1	13.6	1.7
5	316	71.2	58.7	59.7
5	322	28.2	15.7	8.1
5	325	27.0	14.5	3.5
5	328	48.5	36.0	34.5
5	334	33.0	20.5	11.7
5	343	93.6	81.1	84.0
5	349	59.2	46.7	45.0
5	352	51.6	39.1	36.5
5	355	50.3	37.8	35.2
5	361	53.0	40.5	37.1
5	367	27.5	15.0	4.0
5	373	30.7	18.2	11.3
NUMBER OF CLUSTERS	15.			
MEAN		43.9	31.4	25.8
STANDARD ERROR		5.1	5.1	6.3
VARIANCE		391.5	391.5	593.3

UNIT NAME RED TOP HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
6	376	32.2	19.7	9.6
6	382	35.5	23.0	14.2
6	388	40.2	27.7	20.6
6	391	41.5	29.0	21.8
6	394	31.7	19.2	9.5
6	400	37.2	24.7	18.2
6	406	30.3	17.8	8.2
6	418	41.6	29.1	23.0
6	427	51.3	38.8	35.0
6	430	41.2	28.7	22.7
6	433	28.7	16.2	6.7
6	436	42.7	30.2	24.3
6	439	30.1	17.6	8.4
6	442	27.7	15.2	3.7
6	445	40.2	27.7	23.0
NUMBER OF CLUSTERS	15.			
MEAN		36.8	24.3	16.6
STANDARD ERROR		1.7	1.7	2.3
VARIANCE		44.1	44.1	76.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME OJITOS HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
7	451	31.7	19.2	13.1
7	454	32.2	19.7	13.3
7	460	40.2	27.7	23.3
7	469	41.4	28.9	24.7
7	472	30.6	18.1	10.0
7	475	37.5	25.0	18.2
7	478	37.5	25.0	18.1
7	481	33.9	21.4	14.4
7	484	48.2	35.7	33.5
7	493	26.4	13.9	2.4
7	496	38.2	25.7	20.1
7	514	30.6	18.1	12.2
7	517	25.3	12.8	.9
7	520	25.6	13.1	1.2
7	523	29.1	16.6	6.4
NUMBER OF CLUSTERS	15.			
MEAN		33.9	21.4	14.1
STANDARD ERROR		1.7	1.7	2.4
VARIANCE		42.5	42.5	85.9

UNIT NAME LAKE FORK HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
8	526	35.2	22.7	19.0
8	529	38.1	25.6	22.2
8	544	41.7	29.2	24.0
8	547	77.8	65.3	65.4
8	550	34.0	21.5	14.1
8	553	53.1	40.6	41.1
8	556	89.5	77.0	83.2
8	559	73.7	61.2	62.2
8	562	82.0	69.5	70.6
8	565	83.5	71.0	74.3
8	577	98.9	86.4	92.6
8	580	58.3	45.8	44.9
8	583	36.7	24.2	18.2
8	595	75.7	63.2	64.6
8	598	78.7	66.2	69.7
NUMBER OF CLUSTERS	15.			
MEAN		63.8	51.3	51.1
STANDARD ERROR		5.8	5.8	6.8
VARIANCE		500.8	500.8	694.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME COCHITI HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
9	601	27.5	15.0	5.0
9	604	50.7	38.2	36.0
9	610	36.3	23.8	17.0
9	616	31.6	19.1	10.6
9	625	62.1	49.6	48.2
9	631	56.8	44.3	42.2
9	634	43.5	31.0	26.7
9	640	46.2	33.7	30.4
9	643	47.7	35.2	32.8
9	646	41.5	29.0	25.5
9	652	55.3	42.8	40.7
9	658	94.2	81.7	87.7
9	661	95.9	83.4	86.5
9	664	76.7	64.2	65.5
9	670	27.2	14.7	3.5
NUMBER OF CLUSTERS	15.			
MEAN		52.9	40.4	37.2
STANDARD ERROR		5.6	5.6	6.7
VARIANCE		468.3	468.3	681.8

UNIT NAME CAPULIN HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
10	676	41.7	29.2	24.2
10	679	43.6	31.1	26.0
10	700	85.2	72.7	75.0
10	706	80.4	67.9	70.3
10	709	99.7	87.2	99.2
10	712	72.2	59.7	60.0
10	715	79.0	66.5	66.7
10	721	99.7	87.2	98.9
10	724	98.9	86.4	95.7
10	727	73.9	61.4	65.1
10	730	55.5	43.0	39.5
10	733	26.9	14.4	3.3
10	736	32.1	19.6	13.3
10	739	25.1	12.6	.0
10	745	45.1	32.6	30.1
NUMBER OF CLUSTERS	15.			
MEAN		63.9	51.4	51.2
STANDARD ERROR		6.9	6.9	8.8
VARIANCE		723.3	723.3	1164.5

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME AMERICAN SPRINGS HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
11	751	56.2	43.7	42.9
11	757	86.2	73.7	77.6
11	760	57.5	45.0	41.8
11	763	47.5	35.0	28.7
11	766	77.1	64.6	64.5
11	772	32.6	20.1	11.7
11	775	26.1	13.6	5.3
11	781	25.8	13.3	2.0
11	784	32.3	19.8	15.9
11	793	42.8	30.3	26.2
11	802	30.7	18.2	7.5
11	805	37.6	25.1	18.1
11	814	60.3	47.8	45.4
11	817	71.7	59.2	62.2
11	820	74.8	62.3	63.5
NUMBER OF CLUSTERS	15.			
MEAN		50.6	38.1	34.2
STANDARD ERROR		5.2	5.2	6.4
VARIANCE		405.9	405.9	605.5

UNIT NAME LOS ALAMOS HOST DOUGLAS FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
12	826	99.3	86.8	97.1
12	829	26.6	14.1	2.9
12	832	28.7	16.2	5.5
12	844	94.2	81.7	86.2
12	850	99.0	86.5	98.0
12	853	95.9	83.4	92.1
12	856	93.7	81.2	88.3
12	865	80.7	68.2	72.0
12	868	30.4	17.9	9.8
12	871	94.0	81.5	88.2
12	877	98.5	86.0	94.5
12	880	29.7	17.2	7.5
12	883	28.7	16.2	6.3
12	889	28.4	15.9	7.0
12	898	98.2	85.7	95.6
NUMBER OF CLUSTERS	15.			
MEAN		68.4	55.9	56.7
STANDARD ERROR		8.7	8.7	11.1
VARIANCE		1142.1	1142.1	1841.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME JOAQUIN HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
2	76	17.0	4.5	.8
2	82	26.0	13.5	2.0
2	91	69.3	56.8	57.5
2	94	33.2	20.7	11.4
2	97	90.3	77.8	82.6
2	100	29.8	17.3	9.4
2	103	26.4	13.9	3.8
2	109	38.8	26.3	20.6
2	112	60.8	48.3	48.5
2	121	65.9	53.4	52.0
2	127	66.4	53.9	55.1
2	130	27.3	14.8	3.9
2	133	27.6	15.1	4.6
2	136	35.7	23.2	15.1
2	145	70.2	57.7	57.1
NUMBER OF CLUSTERS	15.			
MEAN		45.7	33.2	28.3
STANDARD ERROR		5.8	5.8	7.0
VARIANCE		501.3	501.3	743.2

UNIT NAME SMOKEY BEAR HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
3	151	33.6	21.1	13.9
3	154	53.0	40.5	40.7
3	160	56.3	43.8	42.0
3	163	50.7	38.2	36.5
3	166	30.1	17.6	10.6
3	169	38.6	26.1	20.0
3	172	44.4	31.9	27.1
3	181	36.0	23.5	16.9
3	190	39.2	26.7	23.1
3	193	45.1	32.6	27.9
3	199	30.8	18.3	9.0
3	208	49.4	36.9	34.2
3	214	31.4	18.9	11.8
3	217	46.4	33.9	29.7
3	220	45.2	32.7	27.9
NUMBER OF CLUSTERS	15.			
MEAN		42.0	29.5	24.8
STANDARD ERROR		2.2	2.2	2.8
VARIANCE		72.0	72.0	117.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME TRAIL HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
4	226	55.7	43.2	41.6
4	229	44.1	31.6	27.8
4	235	34.1	21.6	16.2
4	247	69.6	57.1	57.6
4	250	54.5	42.0	38.0
4	253	89.2	76.7	80.7
4	256	41.6	29.1	24.7
4	262	67.0	54.5	56.5
4	265	99.7	87.2	96.7
4	268	53.7	41.2	39.9
4	271	54.1	41.6	38.2
4	274	92.9	80.4	86.7
4	277	98.8	86.3	96.6
4	286	44.2	31.7	29.3
4	289	76.5	64.0	66.0
NUMBER OF CLUSTERS	15.			
MEAN		65.0	52.5	53.1
STANDARD ERROR		5.6	5.6	6.9
VARIANCE		477.7	477.7	715.8

UNIT NAME BLUE BIRD HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
5	301	28.3	15.8	5.8
5	304	28.2	15.7	6.7
5	313	30.0	17.5	7.2
5	316	74.4	61.9	64.0
5	322	29.2	16.7	9.8
5	325	39.2	26.7	18.8
5	328	62.3	49.8	49.5
5	334	69.7	57.2	57.5
5	343	99.7	87.2	97.1
5	349	86.2	73.7	7[illegible].7
5	352	92.4	79.9	84.1
5	355	81.1	68.6	72.2
5	361	61.9	49.4	49.5
5	367	31.1	18.6	10.7
5	373	33.7	21.2	14.2
NUMBER OF CLUSTERS	15.			
MEAN		56.5	44.0	41.7
STANDARD ERROR		6.8	6.8	8.4
VARIANCE		693.4	693.4	1070.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME LAKE FORK HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
8	526	38.7	26.2	23.9
8	529	41.0	28.5	25.2
8	544	82.2	69.7	74.3
8	547	70.1	57.6	57.4
8	550	51.2	38.7	36.5
8	553	49.5	37.0	35.0
8	556	59.7	47.2	46.9
8	559	82.6	70.1	76.6
8	562	77.3	64.8	66.9
8	565	85.1	72.6	77.2
8	577	86.6	74.1	82.7
8	580	98.4	85.9	97.6
8	583	57.6	45.1	46.2
8	595	93.3	80.8	88.4
8	598	99.7	87.2	98.2
NUMBER OF CLUSTERS	15.			
MEAN		71.5	59.0	62.2
STANDARD ERROR		5.3	5.3	6.5
VARIANCE		422.5	422.5	643.4

UNIT NAME COCHITI HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
9	601	32.2	19.7	12.2
9	604	53.3	40.8	38.1
9	610	64.2	51.7	51.6
9	616	31.3	18.8	11.0
9	625	50.0	37.5	35.5
9	631	88.2	75.7	84.0
9	634	40.9	28.4	24.7
9	640	88.6	76.1	83.6
9	643	52.2	39.7	38.5
9	646	57.4	44.9	41.9
9	652	78.0	65.5	68.8
9	658	100.0	87.5	99.8
9	661	99.7	87.2	99.0
9	664	100.0	87.5	99.9
9	670	26.9	14.4	3.5
NUMBER OF CLUSTERS	15.			
MEAN		64.2	51.7	52.8
STANDARD ERROR		6.8	6.8	8.8
VARIANCE		694.6	694.6	1157.0

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME CAPULIN HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
10	676	63.1	50.6	49.5
10	679	36.0	23.5	17.9
10	700	96.2	83.7	91.7
10	706	73.0	60.5	65.2
10	709	99.6	87.1	99.4
10	712	100.0	87.5	98.7
10	715	96.8	84.3	94.0
10	721	100.0	87.5	99.7
10	724	99.1	86.6	97.0
10	727	73.1	60.6	61.2
10	730	94.5	82.0	87.4
10	733	33.6	21.1	13.2
10	736	38.9	26.4	21.6
10	739	30.4	17.9	9.5
10	745	61.7	49.2	48.3
NUMBER OF CLUSTERS	15.			
MEAN		73.1	60.6	63.6
STANDARD ERROR		7.1	7.1	9.0
VARIANCE		752.5	752.5	1212.4

UNIT NAME AMERICAN SPRINGS HOST WHITE FIR YEAR 1977

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
11	751	82.7	70.2	71.0
11	757	98.6	86.1	97.0
11	760	99.2	86.7	97.7
11	763	82.6	70.1	76.1
11	766	95.1	82.6	89.0
11	772	62.4	49.9	47.6
11	775	70.1	57.6	58.6
11	781	31.9	19.4	10.8
11	784	28.8	16.3	7.0
11	793	84.7	72.2	74.5
11	802	46.6	34.1	27.6
11	805	71.7	59.2	61.4
11	814	98.7	86.2	95.6
11	817	90.8	78.3	85.1
11	820	98.1	85.6	96.6
NUMBER OF CLUSTERS	15.			
MEAN		76.1	63.6	66.4
STANDARD ERROR		6.2	6.2	8.0
VARIANCE		576.4	576.4	948.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME SAN MIGUEL HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
1	1	25.2	12.7	.4
1	7	35.9	23.4	15.3
1	10	28.3	15.8	6.1
1	13	25.5	13.0	.8
1	22	25.4	12.9	.8
1	25	25.0	12.5	.3
1	28	26.0	13.5	1.6
1	34	27.5	15.0	3.6
1	37	25.7	13.2	1.0
1	40	26.3	13.8	4.2
1	52	28.7	16.2	6.1
1	58	42.1	29.6	24.5
1	61	25.2	12.7	.8
1	64	25.7	13.2	1.1
1	70	25.7	13.2	1.3
NUMBER OF CLUSTERS	15.			
MEAN		27.9	15.4	4.5
STANDARD ERROR		1.2	1.2	1.7
VARIANCE		23.0	23.0	45.9

UNIT NAME JOAQUIN HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
2	76	25.0	12.5	.8
2	82	25.0	12.5	.4
2	91	27.2	14.7	3.2
2	94	26.2	13.7	3.3
2	97	25.5	13.0	1.7
2	100	25.3	12.8	1.6
2	103	25.0	12.5	.5
2	109	25.1	12.6	.5
2	112	25.5	13.0	1.0
2	121	25.0	12.5	.0
2	127	25.2	12.7	.6
2	130	25.2	12.7	.5
2	133	26.1	13.6	3.0
2	136	25.5	13.0	.8
2	145	26.6	14.1	4.5
NUMBER OF CLUSTERS	15.			
MEAN		25.6	13.1	1.5
STANDARD ERROR		.2	.2	.4
VARIANCE		.4	.4	1.9

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME SMOKEY BEAR HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
3	151	25.9	13.4	1.7
3	154	25.2	12.7	.8
3	160	25.9	13.4	2.4
3	163	26.2	13.7	2.4
3	166	25.0	12.5	.2
3	169	25.3	12.8	1.0
3	172	25.6	13.1	.9
3	181	25.0	12.5	.0
3	190	25.4	12.9	.9
3	193	26.2	13.7	2.1
3	199	26.1	13.6	2.3
3	208	25.0	12.5	.7
3	214	25.2	12.7	.3
3	217	25.2	12.7	.7
3	220	25.2	12.7	.7
NUMBER OF CLUSTERS	15.			
MEAN		25.5	13.0	1.1
STANDARD ERROR		.1	.1	.2
VARIANCE		.2	.2	.7

UNIT NAME TRAIL HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
4	226	28.2	15.7	5.0
4	229	27.9	15.4	4.7
4	235	27.2	14.7	4.3
4	247	25.7	13.2	2.2
4	250	25.6	13.1	1.5
4	253	31.3	18.8	10.6
4	256	25.4	12.9	.6
4	262	25.2	12.7	.8
4	265	30.7	18.2	9.7
4	268	25.2	12.7	.3
4	271	25.7	13.2	1.5
4	274	32.1	19.6	10.7
4	277	44.7	32.2	28.0
4	286	25.3	12.8	.6
4	289	25.3	12.8	.5
NUMBER OF CLUSTERS	15.			
MEAN		28.4	15.9	5.4
STANDARD ERROR		1.3	1.3	1.9
VARIANCE		26.0	26.0	53.3

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME BLUE BIRD HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
5	301	25.2	12.7	.5
5	304	25.1	12.6	.1
5	313	25.1	12.6	.6
5	316	26.8	14.3	5.2
5	322	25.2	12.7	.5
5	325	25.5	13.0	.9
5	328	25.0	12.5	.1
5	334	26.1	13.6	2.7
5	343	25.3	12.8	.8
5	349	25.1	12.6	.8
5	352	25.0	12.5	.0
5	355	26.5	14.0	2.5
5	361	37.8	25.3	20.9
5	367	25.7	13.2	3.3
5	373	25.6	13.1	1.1
NUMBER OF CLUSTERS	15.			
MEAN		26.3	13.8	2.7
STANDARD ERROR		.8	.8	1.4
VARIANCE		10.4	10.4	27.6

UNIT NAME RED TOP HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
6	376	25.1	12.6	.4
6	382	25.4	12.9	1.2
6	388	28.4	15.9	5.2
6	391	26.5	14.0	2.4
6	397	25.5	13.0	1.5
6	400	25.7	13.2	1.3
6	406	25.0	12.5	.0
6	418	25.1	12.6	.3
6	427	25.7	13.2	1.1
6	430	28.6	16.1	4.9
6	433	25.5	13.0	1.0
6	436	26.6	14.1	2.2
6	439	25.2	12.7	1.0
6	442	25.0	12.5	.4
6	445	28.5	16.0	7.5
NUMBER OF CLUSTERS	15.			
MEAN		26.1	13.6	2.0
STANDARD ERROR		.3	.3	.6
VARIANCE		1.8	1.8	4.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME OJITOS HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
7	451	26.7	14.2	5.7
7	454	38.3	25.8	23.1
7	460	31.3	18.8	15.9
7	469	30.8	18.3	11.1
7	472	25.6	13.1	4.7
7	475	29.9	17.4	12.5
7	478	34.5	22.0	15.0
7	481	29.7	17.2	10.4
7	484	34.5	22.0	17.0
7	493	26.2	13.7	1.6
7	496	29.9	17.4	10.3
7	514	27.3	14.8	4.7
7	517	25.1	12.6	1.0
7	520	26.3	13.8	2.7
7	523	28.6	16.1	5.2
NUMBER OF CLUSTERS	15.			
MEAN		29.7	17.2	9.4
STANDARD ERROR		1.0	1.0	1.7
VARIANCE		14.4	14.4	41.8

UNIT NAME LAKE FORK HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
8	526	27.1	14.6	6.3
8	529	29.3	16.8	6.3
8	544	49.8	37.3	31.9
8	547	62.2	49.7	48.8
8	550	27.7	15.2	6.2
8	553	56.6	44.1	43.4
8	556	53.2	40.7	38.2
8	559	76.4	63.9	64.3
8	562	57.2	44.7	43.1
8	565	58.7	46.2	45.5
8	577	82.0	69.5	72.5
8	580	69.7	57.2	57.6
8	583	35.9	23.4	16.6
8	595	79.7	67.2	69.5
8	598	75.7	63.2	65.0
NUMBER OF CLUSTERS	15.			
MEAN		56.1	43.6	40.9
STANDARD ERROR		4.9	4.9	6.0
VARIANCE		362.3	362.3	541.4

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME COCHITI HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
9	601	26.7	14.2	4.5
9	604	35.3	22.8	20.2
9	610	44.2	31.7	25.3
9	616	35.5	23.0	15.7
9	625	44.0	31.5	28.2
9	631	65.3	52.8	52.8
9	634	47.7	35.2	29.3
9	640	95.2	82.7	89.9
9	643	61.0	48.5	48.4
9	646	40.0	27.5	23.7
9	652	65.7	53.2	51.9
9	658	67.1	54.6	55.1
9	661	47.8	35.3	33.0
9	664	60.7	48.2	47.1
9	670	25.6	13.1	4.2
NUMBER OF CLUSTERS	15.			
MEAN		50.8	38.3	35.3
STANDARD ERROR		4.8	4.8	5.8
VARIANCE		342.3	342.3	508.8

UNIT NAME CAPULIN HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
10	676	39.9	27.4	21.2
10	697	41.9	29.4	23.9
10	700	55.2	42.7	41.7
10	706	40.1	27.6	23.3
10	709	58.0	45.5	44.6
10	712	42.7	30.2	28.0
10	715	55.6	43.1	41.4
10	721	48.7	36.2	32.1
10	724	54.7	42.2	41.3
10	727	53.7	41.2	39.8
10	730	54.2	41.7	39.2
10	733	27.2	14.7	8.2
10	736	30.7	18.2	11.9
10	739	26.6	14.1	6.7
10	745	46.5	34.0	31.3
NUMBER OF CLUSTERS	15.			
MEAN		45.1	32.6	29.0
STANDARD ERROR		2.7	2.7	3.3
VARIANCE		112.9	112.9	163.4

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME AMERICAN SPRINGS HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
11	751	72.7	60.2	61.2
11	757	65.9	53.4	53.5
11	760	36.2	23.7	18.2
11	763	46.3	33.8	30.9
11	766	78.2	65.7	66.3
11	772	37.4	24.9	19.7
11	775	26.1	13.6	1.8
11	781	26.2	13.7	2.0
11	784	27.7	15.2	6.2
11	793	47.6	35.1	32.6
11	802	34.4	21.9	13.8
11	805	40.0	27.5	21.2
11	814	48.1	35.6	32.7
11	817	56.9	44.4	42.1
11	820	50.0	37.5	33.4
NUMBER OF CLUSTERS	15.			
MEAN		46.3	33.8	29.0
STANDARD ERROR		4.2	4.2	5.2
VARIANCE		267.6	267.6	409.6

UNIT NAME LOS ALAMOS HOST DOUGLAS FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
12	826	61.7	49.2	47.9
12	829	29.3	16.8	8.0
12	832	27.0	14.5	5.3
12	844	43.5	31.0	26.6
12	850	41.6	29.1	25.0
12	853	42.1	29.6	23.6
12	856	34.1	21.6	14.8
12	865	52.9	40.4	38.0
12	868	39.5	27.0	22.2
12	871	47.5	35.0	32.5
12	877	63.2	50.7	49.9
12	880	28.6	16.1	7.0
12	883	29.8	17.3	7.0
12	889	27.7	15.2	4.5
12	898	58.4	45.9	44.2
NUMBER OF CLUSTERS	15.			
MEAN		41.8	29.3	23.8
STANDARD ERROR		3.3	3.3	4.1
VARIANCE		160.6	160.6	255.5

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME JOAQUIN HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
2	76	26.7	14.2	4.9
2	82	25.6	13.1	1.1
2	91	26.6	14.1	3.4
2	94	27.7	15.2	7.2
2	97	25.6	13.1	3.0
2	100	27.8	15.3	7.5
2	103	25.8	13.3	3.1
2	109	25.7	13.2	1.2
2	112	25.0	12.5	.2
2	121	25.2	12.7	.8
2	127	25.0	12.5	.2
2	130	25.6	13.1	2.8
2	133	25.2	12.7	3.2
2	136	26.5	14.0	2.8
2	145	27.0	14.5	4.4
NUMBER OF CLUSTERS	15.			
MEAN		26.1	13.6	3.1
STANDARD ERROR		.2	.2	.6
VARIANCE		.9	.9	5.1

UNIT NAME SMOKEY BEAR HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
3	151	25.4	12.9	.8
3	154	25.7	13.2	1.6
3	160	32.7	20.2	13.8
3	163	34.8	22.3	16.4
3	166	25.2	12.7	1.7
3	169	26.2	13.7	4.7
3	172	26.0	13.5	2.2
3	181	26.0	13.5	2.0
3	190	27.5	15.0	6.5
3	193	27.7	15.2	5.4
3	199	26.2	13.7	4.4
3	208	29.5	17.0	14.6
3	214	25.2	12.7	.5
3	217	25.6	13.1	1.4
3	220	25.7	13.2	1.9
NUMBER OF CLUSTERS	15.			
MEAN		27.3	14.8	5.2
STANDARD ERROR		.7	.7	1.4
VARIANCE		8.4	8.4	28.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME TRAIL HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
4	226	27.2	14.7	6.1
4	229	27.5	15.0	4.7
4	235	26.6	14.1	3.8
4	247	26.0	13.5	3.7
4	250	26.8	14.3	3.5
4	253	27.1	14.6	6.4
4	256	25.3	12.8	1.5
4	262	25.2	12.7	.7
4	265	28.7	16.2	7.7
4	268	25.5	13.0	3.1
4	271	25.2	12.7	2.5
4	274	38.9	26.4	20.5
4	277	49.5	37.0	33.8
4	286	27.7	15.2	5.5
4	289	26.9	14.4	3.8
NUMBER OF CLUSTERS	15.			
MEAN		28.9	16.4	7.1
STANDARD ERROR		1.7	1.7	2.2
VARIANCE		43.4	43.4	75.5

UNIT NAME BLUE BIRD HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
5	301	26.1	13.6	4.7
5	304	25.2	12.7	2.5
5	313	25.0	12.5	1.4
5	316	32.6	20.1	12.1
5	322	25.8	13.3	3.2
5	325	25.2	12.7	.9
5	328	25.5	13.0	1.3
5	334	28.9	16.4	7.9
5	343	25.5	13.0	1.2
5	349	25.7	13.2	3.1
5	352	25.0	12.5	.2
5	355	25.1	12.6	.9
5	361	51.7	39.2	36.6
5	367	26.6	14.1	5.9
5	373	25.5	13.0	4.0
NUMBER OF CLUSTERS	15.			
MEAN		28.0	15.5	5.7
STANDARD ERROR		1.8	1.8	2.4
VARIANCE		47.3	47.3	83.0

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME LAKE FORK HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
8	526	27.7	15.2	7.9
8	529	27.8	15.3	4.8
8	544	90.7	78.2	85.6
8	547	59.2	46.7	46.1
8	550	36.3	23.8	19.7
8	553	35.7	23.2	19.2
8	556	81.6	69.1	72.6
8	559	91.4	78.9	85.5
8	562	71.6	59.1	57.2
8	565	80.8	68.3	73.7
8	577	83.2	70.7	76.3
8	580	93.1	80.6	88.2
8	583	49.7	37.2	35.5
8	595	100.0	87.5	99.5
8	598	100.0	87.5	99.5
NUMBER OF CLUSTERS	15.			
MEAN		68.6	56.1	58.1
STANDARD ERROR		6.9	6.9	8.6
VARIANCE		716.2	716.2	1116.5

UNIT NAME COCHITI HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
9	601	30.8	18.3	13.1
9	604	68.6	56.1	57.1
9	610	51.3	38.8	35.1
9	616	49.2	36.7	34.5
9	625	57.8	45.3	44.8
9	631	68.2	55.7	56.7
9	634	59.7	47.2	45.6
9	640	88.8	76.3	83.7
9	643	60.7	48.2	48.1
9	646	56.5	44.0	43.6
9	652	77.2	64.7	67.1
9	658	70.7	58.2	58.5
9	661	64.3	51.8	51.0
9	664	65.2	52.7	52.8
9	670	28.7	16.2	9.5
NUMBER OF CLUSTERS	15.			
MEAN		59.9	47.4	46.7
STANDARD ERROR		4.1	4.1	4.9
VARIANCE		248.0	248.0	357.4

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME CAPULIN HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
10	676	70.6	58.1	58.2
10	697	43.2	30.7	26.5
10	700	71.8	59.3	60.0
10	706	47.7	35.2	31.3
10	709	56.3	43.8	43.3
10	712	69.7	57.2	57.5
10	715	53.5	41.0	39.7
10	721	57.9	45.4	42.9
10	724	68.5	56.0	56.8
10	727	51.6	39.1	38.2
10	730	84.5	72.0	74.8
10	733	32.1	19.6	15.5
10	736	27.3	14.8	8.0
10	739	29.7	17.2	12.8
10	745	32.8	20.3	14.7
NUMBER OF CLUSTERS	15.			
MEAN		53.2	40.7	38.7
STANDARD ERROR		4.6	4.6	5.2
VARIANCE		313.2	313.2	413.4

UNIT NAME AMERICAN SPRINGS HOST WHITE FIR YEAR 1978

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
11	751	71.4	58.9	61.2
11	757	85.8	73.3	77.3
11	760	68.0	55.5	56.0
11	763	51.2	38.7	35.8
11	766	76.9	64.4	64.4
11	772	63.5	51.0	49.7
11	775	46.6	34.1	24.0
11	781	28.2	15.7	4.6
11	784	31.1	18.6	10.5
11	793	50.5	38.0	[illegible]
11	802	57.7	45.2	44.1
11	805	61.2	48.7	47.3
11	814	75.1	62.6	63.4
11	817	79.2	66.7	67.5
11	820	64.4	51.9	50.5
NUMBER OF CLUSTERS	15.			
MEAN		60.7	48.2	46.2
STANDARD ERROR		4.4	4.4	5.4
VARIANCE		283.9	283.9	435.8

NORMAL END OF JOB
DATA IGNORED - IN CONTROL MODE